

# The Iron Age

A Review of the Hardware, Iron and Metal Trades.

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## The Ponsard Steel Furnace.

The Ponsard steel furnace, or "Forno-Convertisseur," as the inventor calls it, of which the two sections presented will give an accurate idea, is intended to occupy an intermediate position between the well-known apparatus of Bessemer and of Siemens. It has been pointed out by Mr. J. Sylvain Périssé, in a paper read before the Iron and Steel Institute at its Paris meeting, that the Bessemer process is limited in its application to a certain range of raw material, that its facility for the reworking of scrap is small, and that the plant is an expensive one and can only be worked to advantage if the production is large. On the other hand, the Siemens-Martin process is economical only when a large quantity of scrap enters into the manufacture of the steel; the replacement of the scrap and ends by ore being found to reach a limit by the deterioration of the hearth. From these statements it will be seen that there is an intermediate ground between that occupied by the two systems mentioned, and this it has been Ponsard's endeavor to cover. By referring to the illustrations, Figs. 1 and 2, its simple construction may be readily understood. A, shows a portion of the gas producer from which the products of incomplete combustion pass upward through the flue B, the opening of which lies directly below the end of the hot-air passage C. Both mixing, immediately enter above the hearth proper, D. The hot gases of combustion are then carried out through the flue E, by the chamber F, where any dust, &c., is deposited. As their temperature is very high, it may be suitably utilized for reheating scrap on the hearth G, and then only they serve for heating the air of combustion in the regenerator, the details of which are not shown in the illustrations, and for which we refer our readers to the issue of *The Iron Age* of Oct. 17. Besides this regenerator, the chief characteristic of the "Forno-Convertisseur" is the hearth proper, which, like the Perissé, is inclined, movable and circular. It is besides provided with a series of tuyeres. K is the hearth carriage, L the pipe through which the blast passes through the axis of rotation of hearth through M and N into the tuyeres O. P is a casting orifice. It will be seen that the furnace may either be used for decarbonizing pig by blowing air through it in manner similar to the Bessemer process, or by giving the hearth about half a turn around the inclined axis the tuyeres may be lifted out of the bath and the furnace be made to act like a Siemens open-hearth furnace. The rotation of the hearth automatically cuts off the blast. It is therefore possible to take samples and exactly strike the product required. The claims made are the possibility of using pig low in silicon and carbon, of dissolving large quantities of scrap, and small first cost for a limited output, when compared to the Bessemer process; and economy of fuel by reason of the utilization of the heat of combustion of silicon, &c., and the possibility of working iron alone, when contrasted with the Siemens process. Experiments have been made at the works of Messrs. Blondiaux & Co., of Thy-le-Château, of which we gave some details in *The Iron Age* of Sept. 26 and Oct. 31, in addition to which we would present the following data given by Mr. Périssé:

The Forno-Convertisseur is in communication with the blowing engine of a furnace, which supplies the blast at a pressure of from 7.87 to 8.264 inches of mercury, and to arrive at even that pressure it is necessary to slacken the blowing of the blast furnace. The tuyeres which have been preferred till now are two of the Bessemer pattern, having seven holes of 0.59 inch, which may be used for either two or three operations. A complete experiment could not be made to determine this point, because the apparatus experimented upon was not used continuously. The duration of the blast varied with the nature of the charge from 20 to 40 minutes.

The charge hitherto has hardly exceeded five tons, although the apparatus can work a larger quantity of material; but it must be observed that the pressure of the blast would be insufficient for a greater charge. The operations differed in duration, as always happens in trials of a new apparatus which is still defective. The average was from five to six hours; but it must be observed that the cast iron was put in cold, and then melted on the hearth of the furnace. The steel and iron scrap were heated in an accessory chamber, G, by the waste gases of combustion, before their entrance into the generator H. It would appear from the results obtained by this experience that, by charging the cast iron in the fluid state and having a spare hearth, eight

operations could be made every twenty-four hours, whereas, with the other apparatus used, the number of operations is as follows:

With Siemens-Martin furnaces..... Operations  
With Pernot's furnace..... 3 to 3  
With Bessemer's converter (very variable)..... 10 to 20

The gas generator is fed with coal obtained at Mons, 500 pounds being consumed per hour. The material hitherto used has been Cumberland pig, containing 3 per cent. of silicon, old steel rails and iron puddled from

them in correction of "office errors," it would be well if the Washington authorities would get the Supreme Court to pass upon the subject. The advantage of trade-marks to both manufacturers and the public is pretty well settled, and if Congress has not the constitutional power to protect them, the Constitution needs amendment in that particular as in some others.

The South Pacific Coast R. R. Tunnel.—The San Jose Mercury says: A visit to the main tunnel of the South Pacific Coast

usually great quantities and threatened to overpower the workmen, the superintendent said to him, "Come down, John, till we get rid of this gas," to which the Chinaman replied, "All right, I come as soon as I fix him fast," and lifting his hammer he struck the nail which he was starting a forcible blow. The face of the steel hammer slipped from the head of the nail, causing a single spark to dart off, and in a second there was an explosion which hurled the unfortunate Mongolian singed, bleeding and unconscious from his perch to the stones

the tool to the requirements; an American workmen will as a rule use his brains, and make what you want without spoiling the whole by ridiculous blunders." The complaints, as above presented, form the basis of an argument in favor of giving apprentices a technical education combined with practical work.

## A Famous Colonial Iron Works.

The old Sterling Iron Works in Orange county, N. Y., have been many times described, but not often by contemporaneous observers. The following is translated from a book published in Paris in 1801, and lately unearthed in that city by a Yonkers gentleman of antiquarian tastes. It was written by the Marquis de Creve-Cœur, who was in the French service in the old French and Indian war, and afterward traveled extensively in this country:

Hardly had we put our horses in the stable than Mr. Townsend, the proprietor, came to meet us with the politeness of a man of the world. Having learned that the object of our journey was to examine attentively his different works, he offered to show us all the details, and at once led us to his large furnace where the ore was melted and converted into pigs of 60 to 100 pounds weight. The blast was supplied by two immense wooden blowers, neither iron nor leather being used in their construction. This furnace, he said produced from 2000 to 2400 tons annually, three-fourths of which are converted into bars, the rest melted into cannon and cannon balls, &c. From there we went to see the forge. Six large hammers were occupied in forging bar iron and anchors and various pieces used on vessels.

Lower down the stream (which afforded power to the works) was the foundry, with its reverberatory furnace (air furnace.) Here he called our attention to several ingenious machines destined for different uses.

The models had been sent him, and the machines he had cast from iron of a recently discovered ore, which after two fusions acquired great fineness. With it he could do the lightest and most delicate work. "What a pity," he said, "that you did not come ten days sooner. I would have shown you, first, three new styles of plows, of which I have cast the largest pieces, and which, however, are no heavier than the old fashioned. Each one of them is provided with a kind of steel yard, so graduated that one can tell the power of the team and the resistance of the soil. Second, I would have shown you a portable mill for separating the grain from the chaff, followed by another machine by which all the ears in the field can be easily gathered without being obliged to cut the stalk at the foot, according to the old method."

From the foundry we went to see the furnaces where the iron is converted into steel. It is not yet as good as the Swedes," said Mr. T., "but we approach it—few years more of experience and we will arrive at perfection. The iron which comes from under my hammers has had for a long time a high reputation and sells for \$28 to \$30 per ton." After having passed two days in examining these divers works, and admiring the skill with which they were supplied with water, as well as the arrangements for furnishing the charcoal for the different furnaces, we parted from Mr. Townsend.

**Salt-peter from Bolivia.**—Bolivia is becoming a formidable rival to Peru and Chile in the production of nitrate of soda. With a coast-line not exceeding 100 miles in length, while the neighboring States of Chile and Peru between them monopolize nearly the whole of the Pacific Coast of South America, Bolivia exports more than 260,000 soles, or about 12,000 tons, of nitrate a month from the port of Antofogasta—a quantity equal to that now exported from Iquique in the same period. Greater facilities for shipment exist at Antofogasta than at Iquique, Lima, Callao or Valparaiso, and the Bolivian port is becoming a favorite with foreign shipping. The action of the Peruvian government in endeavoring to maintain a monopoly of the guano and nitrate of soda trade is likely to result in still greater competition in Bolivia.

**Boiler Explosion in a Rolling Mill.**—A large boiler used at Hayden's rolling mill exploded on Dec. 5th. The steam drum was torn in strips, a 20-foot section being thrown through a frame building, then across a wide street and through a 16-inch brick wall, finally striking a tree about 300 feet from its starting point. All the mill buildings in the neighborhood of the boiler house are a wreck.

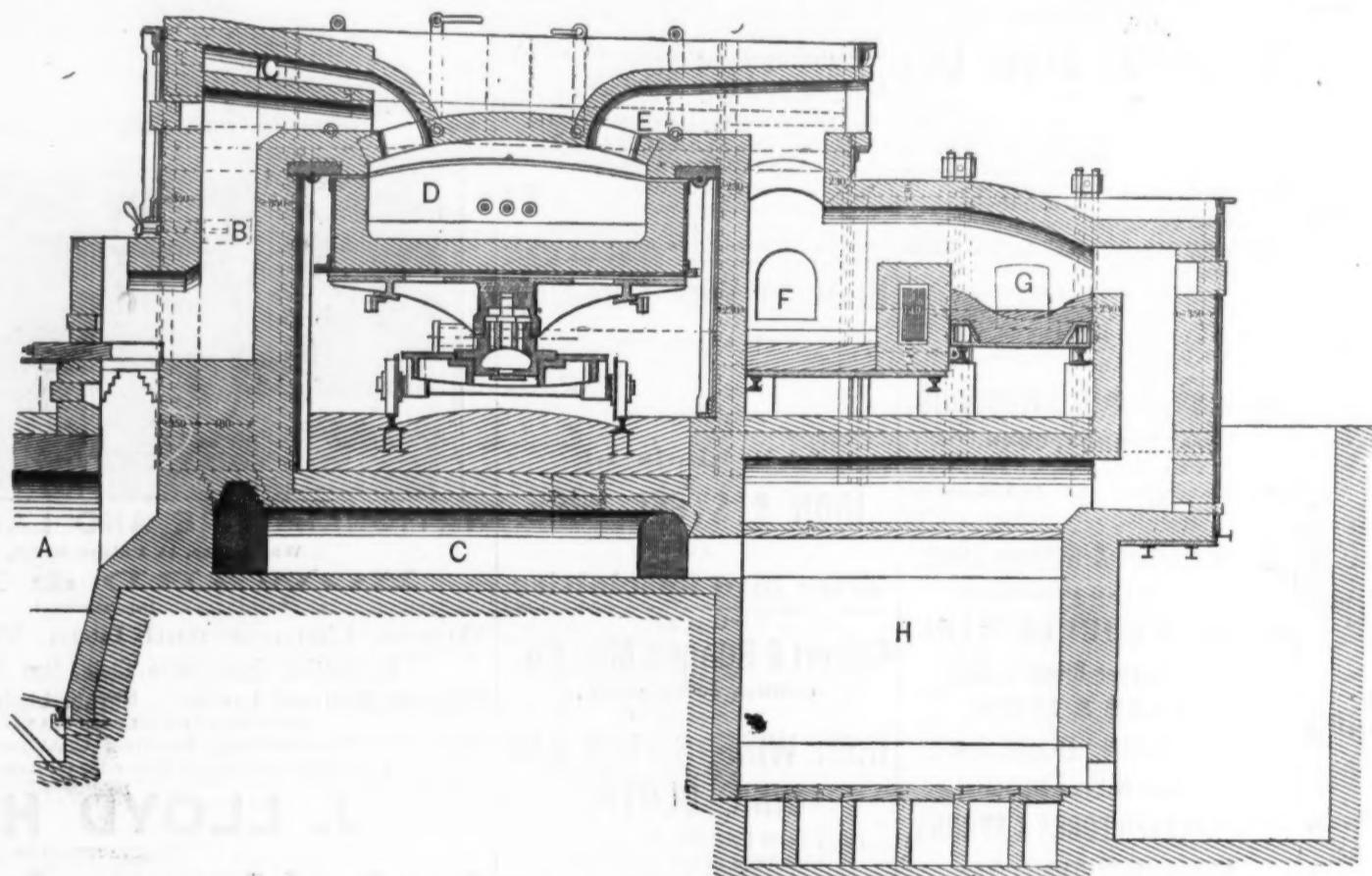


Fig. 1.—LONGITUDINAL SECTION OF THE PONSARD STEEL FURNACE.

Railroad, now penetrating the mountain range forming the line between this and Santa Cruz County, is very interesting. The men on the Santa Clara County end are now delving far in the interior of the mountain, and are progressing at the eminently satisfactory rate of 6 feet per day. The rock through which the excavation is now making way greatly resembles coal, both in appearance and in its nature, being of a black, smooth and somewhat brilliant lining.

The phosphoric pig of the district (the product holding from .1 to .2 of sulphur and from .45 to .8 of phosphorus). The charges were made of various proportions. At first they embraced about one-half pig and one-half old rails, and a fine soft steel was obtained, thanks to the high temperature generated and the use of rich (70 per cent.) ferromanganese. This steel has on analysis the following composition: Carbon, .019; manganese, .032; phosphorus, .006. Several experiments were afterward made with an average composition of one-third pig, one-third old rails, and one-third puddled iron, containing .45 of phosphorus. Under those conditions the steel obtained contained .023 of carbon and .021 of phosphorus. The phosphorus, therefore, was not eliminated, nor could it be in the presence of a silicious lining.

Trade-marks are having a hard time of it between the United States courts and the United States Patent Office, in spite of a great deal of legislation and treaty making on the subject. A large number of British trade-marks were registered in our Patent Office prior to 1876, when Secretary Chandler decided that the law did not authorize such registration, the treaty of 1794 not warranting it even before its abrogation, which took place long ago. This decision led to a new treaty being entered into, under which the "subjects and citizens" of each of the contracting parties obtain the same rights as native subjects or citizens in everything relating to trade-marks and trade-labels. British trade-marks are now being registered, which is a recognition of the insufficiency of previous registrations. The first re-registration was made on Monday, but before this course was adopted the United States District courts in several of the States, our own District Court among them, decided that the Constitution does not give to Congress the power to protect trade-marks, while the United States Court for the Southern District of Ohio has decided just the contrary. British trade-marks will of course be governed by the law in relation to the trade-marks of our own citizens, and, while the Patent Office are going to the expense of re-registering many

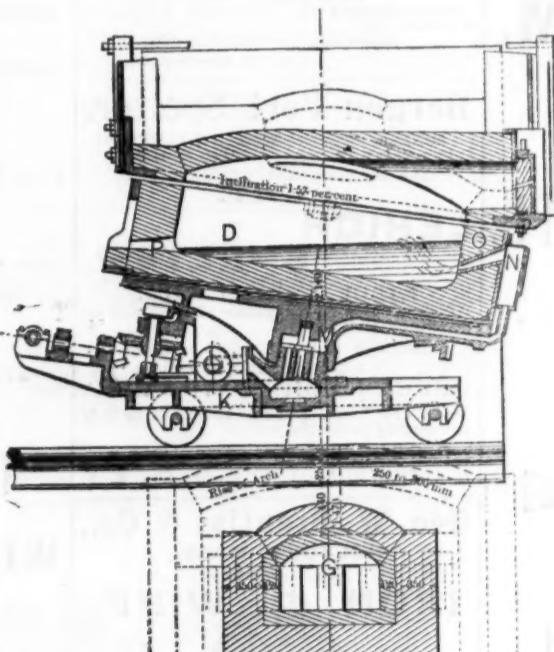


Fig. 2.—SECTION OF THE PONSARD STEEL FURNACE.

face and quite inflammable. Through the numerous crevices in the face of the rock exudes a gas similar to that which comes from petroleum deposits, which causes much annoyance and considerable danger. It rises by its superior lightness to the top of the tunnel, where it is necessary to frequently burn it to prevent it accumulating in sufficient quantities to cause an explosion. A few days ago a Chinaman was engaged in nailing on a cleat to one of the ceiling timbers, which are 16 feet from the roadway, and as the gas was escaping in un-

adopt new makers are themselves obliged to send to this country for American-made tools with which to do their work. He clinches his statements by saying: "The proof of the pudding is in the eating. I have at this moment at least three-fourths of my tools of American manufacture, many of which have been bought at a very fancy price." He thinks that the difference between the workmen of the two countries is that "an English workman does not in the first instance learn what a tool is for and adapt

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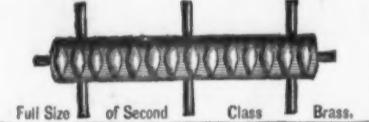
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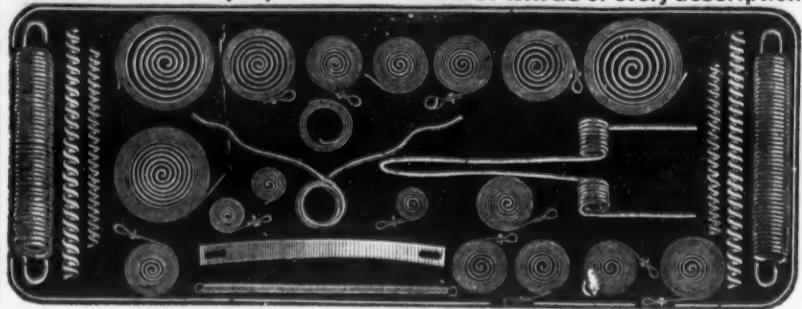
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## Petroleum as a Fuel at Sea.

BY JOHN O. BUERK, M. E.

One of the most plausible fallacies of the day is the proposed substitution of petroleum for coal as a steam fuel in the navy and merchant marine; and although it has already been shown that under existing conditions it is simply impossible that coal should be superseded by any of the hydrocarbons, recent events apparently render it expedient that this statement should be emphatically repeated. The question has, even within the last few weeks, been made the subject of a paper read before a *quasi* scientific assembly, and experiments have been conducted to a certain extent, under official patronage at the navy yard, with the intention of demonstrating the advantages of a new system.

The substitution of petroleum for coal was first suggested by certain oil speculators in New York. Such influence was brought to bear that a committee of investigation was appointed by the Secretary of the Navy. A boiler was fitted up and the necessary inquiries prosecuted for a period extending over some weeks. To this day these experiments and the results obtained remain shrouded in mystery. Great things were foretold, but nothing whatever has become of the prophecy. Although crude petroleum can be purchased very cheaply, not a single gunboat has been fitted to practically test its merits. This fact is not without its importance, and we may safely assume from it that these initial experiments were so far unsatisfactory that it was not worth while to extend them. The advocates of petroleum claim three important advantages as being certain to follow its adoption as a fuel. In the first place they say that as its thermal energy is in excess of that of coal, bulk for bulk, an important saving of space would be secured. Then it is claimed that as its application would be more convenient a considerable reduction in the number of firemen and coal passers would be rendered practicable. And finally, that as a given quantity could be burned in a smaller space, the evaporative efficiency of the boilers would be materially increased. All these assumptions conflict with facts. The thermal energy of petroleum is stated by the more modest of its advocates as being equal to five times that of coal, weight for weight. Those who regard modesty out of place in the regions of assertion, claim a very much greater efficiency. Now, the best crude petroleum—disregarding impurities mechanically suspended in the liquid—may be taken as consisting of 85 parts, by weight, of carbon, and 15 of hydrogen. The composition of the hydrocarbons, however, varies very considerably, and it is hardly correct to assume so high a quality as that given above for every sample. An analysis of thirty-six samples of Pittsburgh coal gave the following results: Carbon, 77 per cent.; hydrogen, 5.32; oxygen, 9.53; nitrogen, 1.93; sulphur, and ash, 5, one ton occupying rather less than 43 cubic feet. Seventeen samples of Lehigh coal gave an average composition as follows: Carbon, 83 per cent.; hydrogen, 4.79; oxygen, 4.15; nitrogen, .98, sulphur, 1.43, and ash, 4.91 one ton occupying a little more than 45 cubic feet. It will therefore not be far from wrong if we take the average amount of carbon in a given weight of coal as 80 per cent. and of hydrogen as 5 per cent. The other elements, not being heat producers, may be disregarded. Once in possession of these data—the substantial accuracy of which can hardly be disputed—it is easy to arrive at a definite conclusion as to the relative value of petroleum and coal as steam fuels.

According to Rankine, the total thermal energy developed during combustion of one pound of carbon is equivalent to 11,194,000 foot-pounds. Dulong estimates the total heat produced by the combustion of one pound of hydrogen at 4.7 times that of carbon. MM. Favre and Silberman state it at 4.28. It is possible that both estimates are excessive, and for the present we will assume the thermal energy of hydrogen as being but four times that of carbon, an estimate which will not be far from correct. We find, then, that the total heat produced by the combustion of 100 pounds of coal is equivalent to 1,119,400,000 foot-pounds, while that produced by the combustion of a like weight of petroleum is equivalent to 1,623,130,000 foot-pounds, the relative efficiency being thus very nearly in the ratio of 11 to 16. In other words, 16 pounds of coal are equivalent to a little more than 11 pounds of petroleum. This, however, presupposes that the hydro-carbon consists solely of carbon and hydrogen, a condition practically impossible of fulfillment, while the calculation deals at the same time with a coal very inferior. Putting both on an equal footing, we find no reason to depart from the conclusion arrived at long since, by those who have investigated this subject, namely, that weight for weight, petroleum is but one-half more efficient than the coal ordinarily supplied to our ships of war and ocean steamers. No amount of sophistry can argue away facts which admit of an almost mathematical demonstration. The specific gravity of petroleum varies within moderately wide limits—generally speaking, it may be taken at about .83. Now, 45 feet of space will hold one ton of coal. The usual allowance at sea is about .48 feet, the additional three feet compensating for the difficulty of filling the bunkers right up to the deck between the beams. A ton of petroleum will occupy about 44 cubic feet of space, so that the pretended saving of room, weight for weight, really disappears on examination.

It is true that, with equal powers, the space saved may amount to one-third of the room occupied by ordinary bunkers, but it is more than doubtful if the consequent advantages would compensate for the inconvenience of stowing an inflammable fluid in bulk. The temperature of a fire-room is seldom below 80 degrees; it frequently exceeds 110. At either temperature rapid evaporation of the more volatile constituents of the petroleum must ensue, and as these would be certain to find their way first into the engine-room or fire-room in consequence of the rush of air to the fires, it is not very easy to see how dangerous explosions are to be avoided. The Du Tremblay ether engine failed principally because it was found practically impossible to preclude the presence of an explosive atmosphere between decks, which necessitated the lighting of the engine-room by Davy lamps. It is difficult to understand how the tanks could be made air-tight at first, or maintained in that condition subsequently; and yet that some such precaution would quickly be found to be absolutely necessary to insure the safety of the ship is beyond a doubt. The claim that the use of petroleum would be more convenient than that of coal is so utterly absurd that it can only be accounted for as the result of theoretical speculation. There is a certain class of inventors whose energies are wholly devoted to the enunciation of propositions and theories which they never take the trouble to work out to a practical result. Thus we are told that no difficulty whatever need be anticipated in effecting the combustion of the proposed fuel; but up to the present moment no reasonably feasible scheme for effecting the desired end has been laid before the world. According to one plan, a porous mate il, the equivalent of a wick, in fact, is to be provided in the furnace. As to the means by which the oil in quantity is to be conveyed to this medium with regularity and safety, we are kept altogether in the dark. If the supply is in excess of the demand, it is tolerably certain that a stream of liquid fire would quickly find its way into the fire-room, and with the ship pitching in a heavy sea, her tanks being but half filled, it is not easy to see how the supply could possibly be regulated with anything like the requisite precision.

The theory involved in the statement that the efficacy of existing steam boilers would be greatly increased by the use of petroleum will not bear investigation. It is possible that their evaporating power might, by judicious management, be slightly augmented. We have every reason to believe that as an immediate result the economical efficiency would manifest a remarkable falling off. We know little or nothing of the conditions under which the hydro-carbons should be burned in a marine boiler furnace; but the little we do know goes to show that the tubular boiler is unfitted for this purpose. The whole question of smoke consumption—hardly yet satisfactorily disposed of—will require to be reopened under extraordinary complications. At the present moment all the heat which existing boilers can utilize and the furnace plates bear without injury, can be produced from coal under normal conditions of draft, and it is at present impossible to detect any prospect of material advantage likely to follow on the production of higher temperatures in marine boiler furnaces.

The Trade of Newcastle.—Speaking before the Newcastle Chemical Society, Mr. R. C. Clapham recently said that in the cement trade, which now forms an extensive industry round about Newcastle, great strides had been made. The production in 1862 was 12,000 tons; for the present year it is 61,000 tons. In the Newcastle manure trade, the production in 1862 was 15,000 tons, and for 1877, 51,000 tons. In the soap trade—a very old local manufacture, dating as far back as 1770—the production in 1862 was 6000 tons, but now it is not more than 3200 tons. Some other trades of the district have partially died out. The copperas trade, which was begun in this district as early as 1748, which flourished for 120 years, and in which seven works on the Tyne were at one time occupied, now only produce 1100 tons annually. The alum business, at one time a very extensive trade, and one of the oldest, established on the Yorkshire coast in 1460, and in which three large works were occupied on the Tyne, has disappeared altogether from the Yorkshire coast, and now only survives in one work in or near Newcastle. The prussianate of potash business, in which a considerable capital was at one time embarked, has entirely gone, its products being superseded by colors from coal tar. The Epsom salt trade has also left the Tyne, but has been extensively established at Middlesbrough, where the production is 3000 to 4000 tons annually. The important trade in glass, established at Newcastle in the fifteenth century, has fallen off to a serious extent. The large bottle trade has also decreased considerably; but plate glass and pressed glass both continue to be produced to a considerable extent.

Heat-Conducting Power of Rocks.—Some time ago Professor Herschell and M. Labour made a series of experiments on the heat-conducting power of rocks. Twenty-eight specimens were reduced to uniform circles of 5 inches diameter and  $\frac{1}{2}$  inch thick, but of six specimens that had been tried, slate plates cut parallel to the plane of cleavage transmitted the heat faster than any of the others. Where the flow of heat became uniform the water was raised 4° Fahr. in 32 seconds; with marble, sandstone, granite and serpentine, about 39 seconds were required to raise it by the same amount. The greatest resistance to the passage of heat was offered by two specimens of shale, gray and black, from the coal measures in the neighborhood of Newcastle, which occupied 48 to 50 seconds in raising the water 1 degree, or half as long again as that taken by the slate.

Professor F. V. Hayden and Major J. W. Powell have reported to the Secretary of the interior the general results of their topographical and geological surveys during the past season. The former says: "The results of the season's labors, though a short one, have been on the whole very satisfactory. About 12,000 square miles of very difficult country were surveyed, much of it in minute detail, and a mass of observation secured. The Yellowstone Park and the Wind River range of mountains formed part of the region covered by Professor Hayden's survey. The work under Major Powell has been prosecuted south and east of the Grand Canyon of the Colorado River. Little irrigable but extensive grazing lands have been discovered, and much ethnological material collected. A map showing the distribution of the various Indian tribes within our present boundaries at the dates when they were first known to Europeans, is nearly completed."

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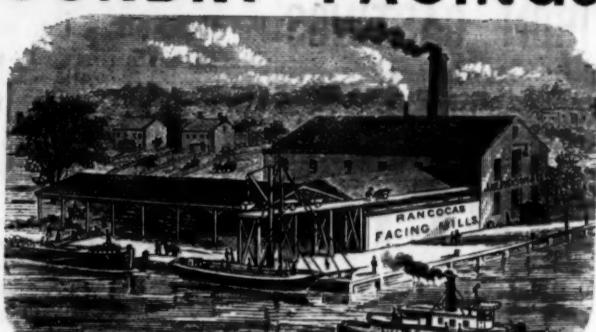
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## The Anthracite Interest.

The Pottsville Miner's Journal of the 29th ult. has the following concerning the anthracite trade for the year and also the outlook for next year:

In the Schuylkill region mining has been uninterrupted during the past week, but it has been determined to stop work after Saturday next for one week. There is scarcely a full week's work left to the region, calculated according to the limit of 17,000,000 tons total production; but as there is already a sufficiency of coal in Philadelphia to supply present demands, it is deemed prudent to hold the quantity still due the region's allotment until a later

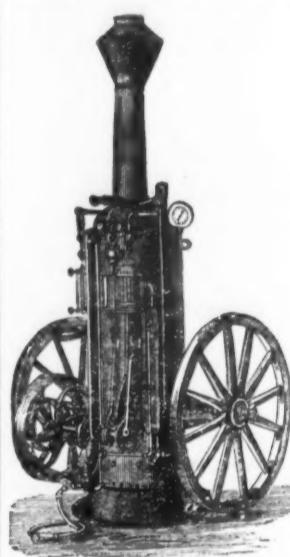


Fig. 1.

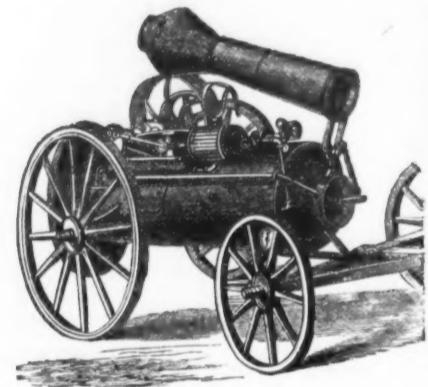


Fig. 2.

## MOUNTED VERTICAL ENGINE.

spring is used to insure smooth and satisfactory work. The boilers are large enough to make sufficient steam without overfiring, the extra height giving large heating surface and good draft. They are tubular and are claimed to be made of the best charcoal iron, the best iron and steel being also used in the engines, which have adjustable brass boxes for crank and cross-head wrists, and every part so fitted that it can be readily removed for repairs.

The maker, A. B. Farquhar, of York, Pa., furnishes them with steam gauge, governor, safety valve and other necessary attachments, with the hinged smoke-stack and communicating exhaust pipe and the spark arrester, making a valuable substitute for horse-flesh in mill and field.

## Improved Canadian Turbine.

This wheel consists of the cylinder of the Canadian turbine, made heavier and stronger and placed within an improved wheel case. The arrangement of the wheel is shown in



THE CANADIAN TURBINE.

The cut, which illustrates a 30-inch wheel and its case. The shute case has eight guides, each alternate one being stationary and strongly bolted to the upper and lower ring. This constitutes the frame of the wheel case. The other alternate guides are pivoted in the center, and thus become gates, being controlled by steel lug pins passing through curved slots in the upper ring of the case, and worked by the gate or siphon ring, which is made to revolve through the necessary arc by means of a curved rack, and a pinion stationed on the dome. In this way each gate controls two openings, one at the point, the other at the heel of the gate, and the pressure being equal on each side of the pivot very little power is required in their management. The gates are accurately fitted and tested with a piece of paper, in order to reduce leakage to a minimum. The water is directed with its full force against the buckets, which fit the case very closely to avoid waste of power, and the remaining force is expended as the water descends upon the lower buckets on its exit to the tail race. The number of buckets and guides is increased with the diameter of the wheel, but only enough to allow the water to enter in compact and smooth streams. It is claimed for these wheels that they can be placed in open or covered forebay, or wheel

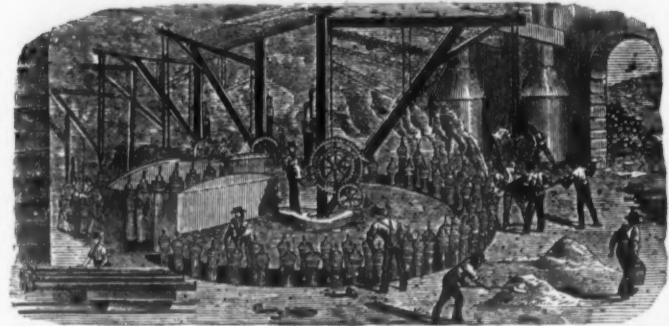
box, as may be desired. The arrangement of the guides is such as to secure the most effective action of the water at all times. They are little affected by backwater, and will give a good percentage of power even during freshets. The manufacturers, Messrs. Meller &amp; Co., of Reading, Pa., claim that the simplicity of the wheel enables them to manufacture it at a low price.

E. H. McDowell, an engineer who left this city a few days ago on his return to the Black Hills, predicts that the number of stampers in the mining region a year hence will exceed 1000. The present number is fully 850, mostly built in Chicago.

Ericson's torpedo boat has made another trial, and we are informed that the public exhibition will take place about a week hence.

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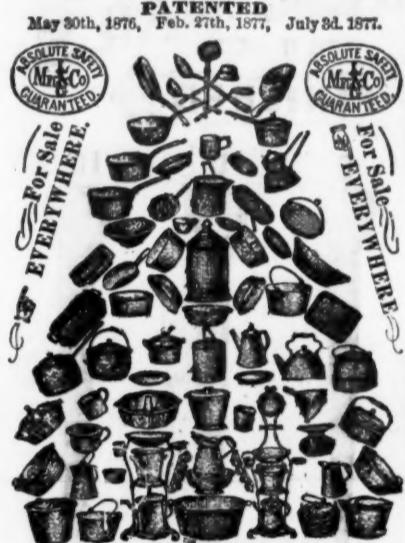


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half pinial. The hinge is made with  
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down readily and let the door sag. It is  
Fast Joint, therefore can be used for  
either right or left hand. By actual test  
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The Davis Fire Escape.

We illustrate upon this page a decided  
novelty in the shape of a hook and ladder  
truck (The Davis Fire Escape, 105 Water  
street, New York), intended to take the  
place of the ordinary trucks and wooden  
ladders. The length of the truck over all is  
45 feet, and the driver's and tillerman's seats  
are 7 feet above the ground. The axles are  
27 feet apart, with 5 feet 6 inch wheels.  
The striking novelty is the methods of con-  
structing the ladders and the provisions  
made for utilizing them. The sides of the  
ladders are of 3-inch steel boiler tubing,  
3-16ths of an inch thick, connected at the  
joints by steel sleeves. The rungs are of  
tube, brazed to side tubes. The ladder thus  
made weighs about 9 pounds per lineal foot.  
The whole truck weighs about 5000 pounds.  
The ladder is made in two sections of 45  
feet each, and when extended to the full  
length lap over each other at the center 6  
feet, giving a total height of 84 feet. As the  
side tubes are not tapped, but continuous  
from end to end of each section, they are  
made available as stand pipes. This very  
novel feature of making the sides of the  
ladders answer instead of lines of hose,  
greatly decreases the weight to be carried  
by the ladder, while it does away entirely  
with the labor of getting up a heavy line of  
hose. At the top of each length there is a  
coupling for attaching a nozzle, with a short  
piece of pipe to give the requisite flexibility.

socket having rubber packing, the weight  
of the ladder making the joint tight. In  
the cut the fireman on the top of the lower  
ladder is represented as throwing a stream  
from the left-hand pipe or ladder side, while  
the one at the extreme top is playing from  
the right-hand side. There are a consider-  
able number of very obvious advantages ob-  
tained by this method of construction. The  
tubular steel ladders give the greatest stiff-  
ness and strength with the least material,  
while their utilization for leading the water  
to the nozzle obviates the difficulties and  
delay of getting a line of hose up a long lad-  
der. The ladder being of metal with cold  
water passing through it, is in no danger of  
being burned no matter how hot a flame it is  
made to expose to, a danger to which  
wooden ladders are peculiarly liable, and  
by which they are often greatly injured.  
The nozzles and sufficient hose are always  
kept in position for immediate use.  
Eight men can operate a truck of this kind,  
which we believe is five or six less than  
are usually required. We do not know  
the exact figures in regard to the cost, but  
should judge that a truck of this kind can  
be put on the market much below those of  
the usual patterns.

An interesting story of an inventor's trials  
and tribulations, finally ending, not in his  
own success, but in that of a third party, is  
told in explanation of a decision of the  
United States Circuit Court of New York,



THE DAVIS FIRE ESCAPE.—LADDERS IN POSITION WITH HOSE CONNECTED.

In the engraving the ladder is shown ex-  
tended, but, in order to bring the drawing  
within the size of our page, it was necessary  
to break out a portion from each length, so  
that the ladder does not appear as lofty as  
it would when actually in position. At the  
bottom it will be observed that the tubes  
are connected with lines of hose from the  
steamers, or hydrant when the Holley sys-  
tem is employed. The construction of the  
ladder is very simple. The sides of the  
truck proper are of iron or steel angle bars  
and channel plate, disposed so as to make a  
very strong and light truss. Over the  
"fifth wheel" on the forward axle there is  
a sort of turn-table, shown at D, which car-  
ries the machinery for raising and turning  
the ladder. The ladder is put in position by  
running the truck as near the curbstone as  
possible, then adjusting the brace C so as to  
steady the ladder as it rises. The ladder  
is then raised above the truck by means of  
the crank operating through the gears F on  
the sector E. This raises the ladder on the  
fulcrum B to the proper angle. It is, how-  
ever, still over the truck and not inclined  
toward the building, nor is the upper length  
extended. The windlass, worked by  
the upper crank, is now put in operation, and  
the upper length of the ladder extended by  
means of it, if necessary. Then by oper-  
ating the hand wheel, shown at the side of the  
turn-table, the ladder is turned in the re-  
quired direction, and the upper end lowered  
against the building. The necessary water  
connections have of course been made in the  
meantime with the fire-engines, and the ap-  
paratus is ready for work as soon as the  
men reach the top. The connection made by  
the upper and lower sections is made by an  
automatic coupling when the ladders are  
fully extended. It consists of a short sec-  
tion of tube working in a ball and socket-  
joint, and is guided into a funnel-shaped

granting an injunction against the Western  
Union Telegraph Company against the use  
of wires insulated with gutta percha, and  
ordering an accounting with the holders of  
the patent therefor. Gutta percha became  
an article of commerce about 1845. At that  
time, and for some years thereafter, Morse  
and others were experimenting with various  
articles designed to serve as insulators for  
wires used under water. In 1848 Faraday  
first made public the insulating properties of  
gutta percha, but he was precluded in the  
discovery by George B. Simpson, who, in  
November, 1847, filed his first application  
for a patent for the use of gutta percha as  
an insulator. He was too poor to pay the fees  
and had to borrow the amounts required,  
but his application for a patent was refused.  
In the fall of 1848 his invention was tested at  
Baltimore and proved successful, but five successive applications for patents were refused, and Mr. Simpson, who had paid all the fees with borrowed money,  
at length abandoned the attempt, and in  
1850 went to California. He remained there  
eight years, but returning to the East found  
his invention in general use. Then he began  
again, with his own money, the battle for  
his rights. For eight years he filed ap-  
plications with each new Commissioner of  
Patents with the usual result, rejection. In  
1866 he got a relief bill through Congress,  
and under this obtained a favorable report  
and a patent. He was at the time (1867) a  
paymaster in the United States service, sta-  
tioned at New Orleans, and three months  
after the patent was granted died of yellow  
fever. His widow sold the patent right for  
a trifle to Arthur N. Eastmann, who has  
since died, and it is the assignee of the latter  
who has won the suit in New York. The  
story is not a very encouraging one for in-  
ventors, but it may be for assignees and  
lawyers.



# USE THE BEST.

NEW



AMERICAN FILE COMPANY.

THE NEW AMERICAN FILE COMPANY have the exclusive right to use the Bernot process for cutting Files. By this method all the advantages of hand cutting are secured, together with an accuracy unattainable in hand work. They are the only manufacturers who employ machinery for testing Files and Steel.

NEW AMERICAN FILE CO., Pawtucket, R. I.

**AUBURN FILE WORKS,**  
Superior Hand-Cut  
**FILES AND RASPS,**  
MADE FROM IMPORTED STEEL. EVERY FILE WARRANTED.  
**FULLER BROS., Sole Agents,**  
89 Chambers and 71 Reade Streets, N. Y.

Granted for



McCAFFREY & BRO.,  
Pennsylvania File Works,

Fourth St., north of Columbia Ave., Philadelphia, Pa., U. S.

Superior Goods.



Silver Medal.



Domestic and foreign buyers who are desirous of handling a superior File or Rasp should send us their orders. Gentlemen visiting the Exhibition Universelle in Paris are invited to examine our exhibit at D 3. American Section.

Highest Premium.



Steam and Frost prevented on Show Windows.



### REVOLVING VENTILATORS

For everything (and every size), from a hat or cap to an exhibition building. Kitchens, Laundries, &c., ventilated without draft. Durable, strong, without rivets or solder. Oiled for six months. Each one has storm cap. Retail price, size six inch diameter, \$1.00 and upwards; apparatus with which any one can cut circles in glass, 15 cents each.

Protective Ventilators avoid drafts, exclude dust, dampness, malaria and germs of disease; adopted by hospitals, schools, institutions, &c.; applied to stoves, ovens, &c.

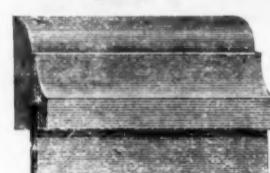
From my personal experience and that of my patients who have used your Ventilator during the past six months, I am convinced that your method of removing dust, impurities and dampness from the atmosphere is the best which has yet been proposed. By it the air in an apartment can be constantly changed without creating drafts. I would especially recommend its adoption in sick rooms, sleeping apartments, nurseries, and school-rooms.

Air Filters and Moisteners, placed over hot-air registers of furnaces, &c., prevent dust and supply steam filtered air. Prices and discounts to the trade sent on application.

The "Economy" Molding Weather Strip is perfect in every respect. By enlarging edge of rubber or felt, and making slot molding to correspond (see engraving), we save all expense of molding. Our "Economy" strip will last a lifetime, because rubber, etc., has only to be removed by taking old piece out of either end of molding, and sliding in a new piece. By this method of securing rubber an uncertainty of fastening or undoing of glass is entirely overcome.

Rubber supplied with enlarged edge and instructions to enable Car Manufacturers, Carpenters, Builders and far off trade to make slots in Sashes, Doors, Moldings, &c., and thus make perfect Weather Strips.

No. 6.



BRACHER VENTILATOR CO., No. 3 Park Row, New York.



"Common Sense"

### MOUSE TRAPS,

For Home and Export Trade.

BEST IN MARKET.

RIPLEY MFG. CO.

Unionville, Ct., U. S. A.,

Manufacturers of

House Furnishing Hardware.



Romer & Co.  
Established 1837.

MACHINE MOULDED

MILL GEARING.

AS ACCURATE AS CUT GEARING

AND MORE DURABLE IN USE.

Saves Time and Expensive Patterns,

SHAFTING, PULLEYS AND HANGERS,

A SPECIALTY,

LEFFEL TURBINE WATER WHEELS,

STEAM ENGINES AND BOILERS,

MIXERS FOR FERTILIZERS AND CHEMICALS.

POOLE & HUNT, Baltimore.

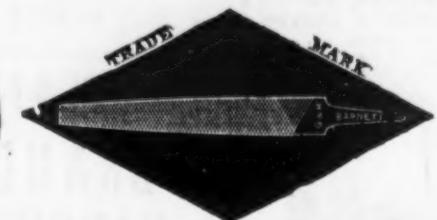
Manufacturers of Patent Scandinavian or Jail Locks, Brass Locks for Railroads and Switches. Also Patent Stationary E. R. Car Door Locks. Patent Piano and Sewing Machine Locks.

115 to 145 Railroad Avenue, New York, N. Y.

Illustrated Catalogue sent to the trade on application.



# Black Diamond File Works.



Awarded by Jurors of Centennial Exposition, 1876, for

"VERY SUPERIOR GOODS."

G. & H. BARNETT,  
39, 41 & 43 Richmond St., Philadelphia.

CHARLES B. PAUL,  
Manufacturer of HAND CUT FILES.

Warranted CAST STEEL.  
157 Tenth Street, Williamsburg, New York.  
Established 1863.

HELLER & BROS.,  
MANUFACTURERS OF CELEBRATED  
AMERICAN HORSE RASPS AND FILES,  
NEWARK, N. J.

In view of the many so-called improvements and ingenious arrangements of the teeth of Horse Rasps made within the last few years, we take occasion to recommend our own Horse Rasps, made of the best American Steel, all hand cut in the old style by the most skilled mechanics; and we guarantee them to be unequalled in the market, as is best evinced by the unanimous verdict of all the skilled horse-shoers who are using them for the last fifteen years all through the United States.

For sale by the leading Hardware and Iron Dealers in the United States and Canada.

### AUSABLE HORSE NAILS

POLISHED OR BLUED.

### HAMMERED AND FINISHED



### The Ausable Nails

Are Hammered Hot,  
And the Finishing and Pointing are  
Done Cold,

Thus Imitating the Process of Making Nails by Hand.

Quality is Fully Guaranteed.

For Sale by all Leading Iron and Hardware Houses.

ABRAHAM BUSSING, Secretary,  
4 Warren Street, New York.

### LIGHTNING HAY KNIVES,

WEYMOUTH'S PATENT.



This knife is the best in use for cutting down hay and straw in mow and stack, cutting fine feed from bale, cutting corn stalks for feed, cutting peat and ditching marshes.

The blade is best cast steel, spring temper, easily sharpened, and is giving universal satisfaction. A few moments' trial will show its merits, and parties once using it are unwilling to do without it. Its sales are fast increasing for export as well as home trade, and seems destined to take the place of all other Hay Knives.

They are nicely packed in boxes, one dozen each, of 10 lbs. weight, suitable for shipping by land or water to any part of the world.

Manufactured only by

Hiram Holt & Co.,  
East Wilton, Franklin Co., Maine.  
For sale by the Hardware Trade generally.

SEMPLE & BIRGE MFG. CO., Agents at St. Louis.

F. F. ADAMS & CO.,  
Erie, Pa.

# A. FIELD & SONS

TAUNTON, MASS.,

MANUFACTURERS OF

AMERICAN AND FRENCH

# WIRE NAILS, TACKS, SHOE NAILS,

And Every Variety of Small Nails.

Offices &amp; Factories at Taunton, Mass.

Warehouse at 78 Chambers St., New York,

where may be found a full assortment of Tacks, Brads, Wire Nails, &amp;c., for the accommodation of the New York Wholesale and Jobbing Trade.

Any variations from the regular size or shape of the above-named goods made from sample to order.

A SILVER MEDAL has been awarded above goods at the Paris Exposition, being the only medal awarded any American manufacturer of Tacks and Wire Nails.

**Hoisting Machinery**  
MANUFACTURED BY  
CRANE BROTHERS MFG. CO.,  
Chicago.

**The Upright Family Scale**  
PATENTED.



Packed up in neat pasteboard boxes, and  
no charge for cases.

Manufactured by  
JOHN CHATILLON & SONS,  
89, 91 and 93 Clif St., NEW YORK.

**Geo. M. Eddy & Co.,**  
351 & 353 Clifton Ave., Brooklyn, N. Y.  
Manufacturers of

**MEASURING TAPES.**  
Of Cotton Linen and Steel.

For all purposes for which Tape Measures are required.

Only Manufacturers of

Paine's Patent U. S. Standard Steel

Measuring Tapes,

Pat. Spring Measuring Tapes

of Linen and Steel.

FINE TEMPERED STEEL SPRINGS,

FINE TEMPERED STEEL BAND SAW,

From 1/4 inch wide upward. Warranted tougher than

any other Band S. W. Catalogues on application

**PRIZE MEDALLISTS:**

London, 1862; Oporto, 1865; Dublin, 1865; Paris, 1867; Moscow, 1872; Vienna, 1873, and only Award and Medal for Self-Coiling Steel Shutters at Centennial Exhibition, Philadelphia, 1876.

**CLARK & CO.,**

ORIGINAL INVENTORS AND SOLE

PATENTEES OF

Noiseless Self-Coiling Revolving

**STEEL SHUTTERS,**

FIRE AND BURGLAR PROOF.

Also Improved

**Rolling Wood Shutters**

Of various kinds, Clark's Shutters are the best and cheapest in the world. Are fitted to new Tribune Building, Lenox Library, Delaware and Hudson Canal Co.'s Building, Transatlantic Steamship Co.'s new Dock, American News Office, &c. Posey County Court House, Mt. Vernon, Holt County Court, Oregon, Mo. Also to buildings in Boston, Cincinnati, Detroit, Janesville, Wis., Baltimore, Canada, &c. Have been for years in daily use in every principal city throughout Europe, and are endorsed by the Leading Architects of the World.

Office and Manufactory,

162 & 164 West 27th Street, N. Y.

## ANSONIA CORRUGATED STOVE PLATFORM

Manufactured by the

Ansonia Brass & Copper Co.,  
Office, 19 & 21 Clif Street,  
NEW YORK.Patented  
Oct. 24, 1876.

Cut Showing Round Platform.

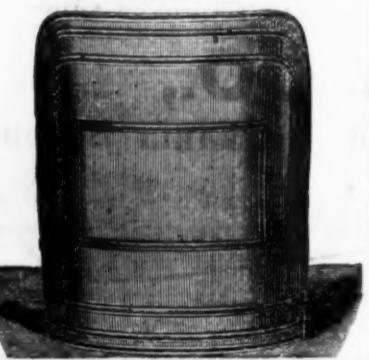
Section Showing Edge.

## ANSONIA Bronzed Fire Screen, with Ornamented Moldings.

PATENT APPLIED FOR.

The Portable Bronzed Fire Screen or Shield, as shown in the illustration, is especially designed for the safety and protection of walls, furniture, woodwork, paper or varnish from heat.

Being constructed of metal, with fine and substantial springs in front to stand alone, it may be easily adjusted to any position about a stove, before a grate or fire place. The demand for something useful, durable and ornamental as a Fire Screen has long been felt, and having finally accomplished the desired result, we are prepared to fill all orders promptly.



The Ansonia Corrugated Stove Platform, with its heavy ogee border, is believed to be the best Platform offered to the trade. As shown in the illustrated section herewith it requires no nailing to keep it in place or to prevent it from turning up at the edge; while the metal is of sufficient thickness to require no lining.

The low price, superior quality and fine finish of this Platform will be readily acknowledged.

Packed 24 in a case.

Send for price list.

## BROWN & SHARPE MFG. CO.

Providence, R. I.,

MANUFACTURERS OF

## MACHINERY & TOOLS.

Gears Cut and Index Plates Made and  
Drilled to Order.

## PATENT CUTTERS FOR THE TEETH OF

## GEAR WHEELS

can be sharpened by grinding without changing their form. Cutters made on this plan will outlast many of the old form, with the advantage of being always ready

for use. If the cutter becomes dull before a wheel is completed, it can be taken out, sharpened and returned to its place in a few moments without risk of altering the form of teeth to be cut. Cutters for milling any irregular form made to order on the same plan. Parties having occasion to use mills for irregular shapes on sewing-machine, gun or other work, will readily see the advantage such cutters possess over those in general use, both as regards economy and convenience. Descriptive circular with price list sent by mail on application.

## SABIN MFG. CO.,

MONTPELIER, VT., Manufacturers of

## PATENT DOUBLE ACTING SPRING BUTTS,

### Sabin's Lever Door Springs

For Heavy Doors.

The BOSS and CROWN SPRINGS for Screen and Light Inside Doors.

General Agents. HENRY BROOKS & CO., 127 Milk Street, Boston.  
E. P. WHIPPLE, 100 Chambers Street, New York.  
KELLOGG, JOHNSON & BLISS, 108 Randolph Street, Chicago.

## RHODE ISLAND HORSE SHOE CO.,

OFFICE, 81 Canal Street, Providence, R. I.

WORKS at Valley Falls, R. I.

Manufacturers of

PERKINS and RHODE ISLAND PATTERNS OF  
HORSE AND MULE SHOES.

## The Condition of British Industry.

A correspondent writing from London under date of Nov. 14th, presents the following picture of the condition of British industries, which we certainly hope is over-drawn:

British trade has now come to a state that is truly deplorable. The cotton trade seems all going to ruin; the iron trade is not a whit better off; the coal trade is only a trifle better; and other industries, almost without exception, are in a worse state than has been known before since the Crimean war. Not a day passes but tells of more commercial failures. The newspapers seem carefully to avoid giving any prominence to such news, and many failures for sums of \$500,000 or more are noticed in a short paragraph of only two or three lines, and that, perhaps, a mere note at the foot of some column, where it is likely to attract very little attention.

Here are a few prominent failures noticed in the papers of yesterday and to-day only. They are strictly the occurrences of only two days, though the list certainly is a trifle longer than usual for that length of time. The pound sterling is taken as equal to exactly \$5. Messrs. Matthews & Thielman, of Glasgow, merchants, have failed, with liabilities amounting to \$2,432,690, and assets \$101,195, showing a deficiency of \$2,331,495. C. Donner & Co., of Great St. Helens, have failed, with liabilities of about \$500,000. F. Whitaker, of Halifax, Yorkshire, wool staplers, with liabilities of \$200,000 and assets of \$50,000. The above are of yesterday's news. This morning the failure is noticed of Messrs. Potter, Wilson & Co., of Glasgow, merchants, with liabilities of \$1,080,887 and assets \$810,197, showing a deficit of \$270,690. Several more failures for comparatively small amounts could be given. The liabilities of the four firms mentioned above amount to \$4,213,577.

The masses of the English people are very poorly prepared for times like these. In the first place, very few of them own the homes in which they live; but few of them know that independence which comes from the absolute ownership of a home. This first great incentive to prudence and accumulation of property is entirely wanting. The chief obstacle in the way of this is the fact that the land is not for sale. They understand the practice of a rigid economy, for their wages are low; but the trouble is that they spend their all as they go. In the strictest sense, the British workmen may be said to live from hand to mouth.

Another sad fact is the national habit of beer drinking. The beer used by working people costs, in London, eight cents a pot (quart), and in other parts of the country it is often no more than 6 cents. One pot of beer a day is certainly the least quantity a workingman uses. This alone will come to \$20 or \$25 a year. Two pots a day are far more common. Add to this the fact that his entire family uses beer, and it will be easily understood that the beer money of a single family among the workpeople readily runs up to \$75 or \$100 a year. It is not at all uncommon to find one-third of the whole family income spent for beer.

The masses of the English are also very deficient in education. The sum of the matter is about this: The system of the country has forced the masses very low down into ignorance and poverty, and they seem to have been taught to drink plenty of beer, and spend their money as fast as it came. Their faults are many, it must be confessed, but I look upon them as undeserving of blame, after all. At all events, when they get out of employment by tens of thousands, as they are now, very few have anything to fall back upon, and they are charges on the parish at once, and almost en masse.

Another thing that bears heavily upon the working classes in the enormous cost of all staple articles of food. A fair quality of beef steak is to be had nowhere in England or Scotland under 28 cents a pound, and the poor man's staple, potatoes, rarely costs less than \$1.25 or \$1.50 a bushel.

In the cotton manufacturing districts many of the mill owners are struggling for existence. Within the last month or six weeks mills have been closing and resorting to short time everywhere. Wages were reduced to 10 per cent. all through that district last spring; many mills have now taken off another 10 per cent., and all are threatening a second reduction.

Many of the masters now freely admit that American competition in their foreign and even in their home markets has a great deal to do with the crisis in the cotton industry. As an average, the mills of the whole cotton district are now admitted to be running only about four days a week, and the trade rapidly grows worse. Many mills have entirely stopped. In Blackburn, a town of 80,000 inhabitants, there are now between 8000 and 10,000 operatives of the cotton mills entirely out of work. The greater part of them are receiving parish relief; but the amount so large a number can receive is so very small that it scarcely keeps them from absolute starvation. A telegram received from that town yesterday says: "Great distress prevails in every ward, employment in the cotton mills is decreasing, and a great crisis is at hand."

Some other towns are just as badly off as Blackburn. The worst has not come yet, however, and it is feared that Christmas will find the distress doubly intensified. In Oldham the mills have had scarcely anything else than losses to report in the last 18 months, and several firms have had adverse balances of \$25,000 each. The Greenheads Spinning Company, which is one of the model workingmen's companies, and which used to declare 30 per cent. dividends of profit, has now declared a loss of nearly \$10,000 in the last quarter. In Darwen the largest mill has stopped entirely, and in Preston 314,500 spindles are idle.

In the coal and iron trades wages have been reduced from 15 to 20 per cent. in the last year, and the last reduction of the Northumberland miners was 12 1/2 per cent. The average of Scotch miners' wages is less than 75 cents a day, in Wales about 85 cents, and in Northumberland about \$1.25. In the Black Country scarcity of work has caused great distress and destitution. It is asserted that at Wolverhampton and other centers of the coal and iron trades many hundreds of

people are actually starving. Families are often without food several days in succession. In some cases men have been found to be so weak from want of food that they have actually sunk to the ground exhausted upon attempting to work. The same story comes from Sheffield. Thousands are entirely out of work, and almost none work full time.

The *Engineer* is one of the very best of the journals devoted to the coal and iron trades. The regular correspondent of that paper writes as follows from Sheffield:

"Dr. Foote, the medical officer, says the present condition of the iron workers and their families is beyond comparison with anything in previous years. The distress is deplorable and harrowing to behold; and the doctor adds: 'I can truly say I have never witnessed anything like the present scarcity and poverty.'

Then the correspondent adds something that shows that American competition is felt in the iron trade, too:

"Although trade is known to be bad in America and Germany, the local firms in Sheffield who import American and German productions are about the only persons who do not complain of dull trade. I was talking to the senior partner of one of these firms on Tuesday and he told me that the demand for the innumerable Yankee notions, as well as German articles, particularly those known as Lancashire tools, shows no appreciable falling off. During all this prolonged period of depression," said he, "we have really not felt much change."

That is most remarkable language for an Englishman, and especially for one versed in the iron trade. Those same Yankee notions are also sold at scores of places in London, and the amount of English goods displaced by them must be very considerable. They are attractive alike by their quality, adaptability and cheapness. The very fact that an article is American-made has come to be a recommendation of its quality.

A year ago the building trades were comparatively brisk, and in some cases the workmen actually were on a strike for better wages. Now they are glad to get work even at lower rates than a year ago. The tin mining trade of Cornwall is also in a state of stagnation, and the same is true of the potteries of Staffordshire. No industry is doing well, and the best that can be said of any is that they are working full time and just managing to live. This last may be said of the woollen and worsted industries. The trade has diminished considerably, but there is no serious complaint.

Even the farmers complain of hard times and of the foreign supplies of grain, meat and other staple foods which compete with the English products.

The land-owner in England is not generally directly connected with the tilling of the soil; he merely collects his rents. The farmer who pays high rent very naturally finds fault with the cheap foreign products which take away his profits. If the American farmer loses his crop he loses not much more than his labor; when the English farmer loses a crop he has a large money loss besides, for he still must pay his rent, which averages \$8 or \$10 an acre.

On nearly every hand there is nothing but ruin to be seen in England's once prosperous industries.

**A Large Steel Product.**—The *Scranton Republican* says: The steel works made in November, in 25 1/2 turns, 5477 tons 11 cwt. of ingots, or an average per turn of 214 tons 16 cwt. This is believed to be the largest month's average per turn ever yet made by two converters anywhere in the world.

The steel rail mill made in November, in 25 1/2 turns, 4314 tons 6 cwt. of first quality rails, or an average per turn of 169 tons 3 cwt. This is claimed to be the largest month's average per turn ever yet made anywhere in the world on one rail train.

More than one-half the above was on light 50-pound rails. The amount of this product will be better appreciated when we explain that the steel works and mill are running single turn, or half turn—that is, days only, and not night and day. The largest month's work, double turn, ever made at the old iron rolling mill on one train was in May, 1873, when 4662 tons rails were turned out,

which was at that time an unprecedented figure; 4000 tons rails was then considered a large month's work, double turn, yet this is now beaten running single turn, or half turn.

**The Iron Age** will please take notice that this is not a case of "spurts in manufacturing," but is the result of long-continued efficient management, and indicates the progress and ability of our American ironmasters.

The mill here will probably steadily continue to increase its product from month to month.

**The "Black Star" Boiler Fluid.**—The formation in steam boilers of a hard scale, which has to be removed by the slow and laborious process of picking, and which gradually accumulating absorbs otherwise useful heat, causes the iron to burn and rapidly decay has always proved a constant source of trouble and expense. Money expended to secure a means of preventing the formation of this scale and of removing it when formed without injury to the boiler,

would be an investment more than repaid in actual saving in fuel. Articles claiming this valuable function are in the market, and among them a boiler fluid, called the "Black Star Anti-Incrustator and Acid Water Neutralizer," which is said to have been used in many well-known establishments with good results. Chemical analysis shows it to contain alkali and woody matter which neutralizes the acid water of mines, while it also tends to break up and loosen hard scale already formed and prevent further deposition. This is claimed to be done without injury of any kind to the texture of the boiler.



**B. KREISCHER & SONS,  
FIRE BRICK  
AND  
CLAY RETORT WORKS.**

Established 1843.

Office, foot of Houston Street, East River,  
NEW YORK.The largest stock of Fire Brick of all shapes and  
sizes on hand and made to order at short notice.Cupola Brick, for McKenzie Patent,  
and others. Fire Mortar, Ground Brick, Clay and  
Sand. Superior Kaolin for Rolling Mills and foundries.  
Stone Ware and other Fire Clay and Sand,  
from my own mines at New Jersey and Staten  
Island, by the cargo or otherwise.

**NEWTON & CO.,**

Successor to

**PALMER, NEWTON & CO.,**  
ALBANY, N. Y., Manufacturers of

**FIRE BRICK**

**Stove Linings,  
Range and Heater Linings**

Cylinder Brick, &amp;c., &amp;c.

**M. D. Valentine & Bro**

Manufacturers of

**FIRE BRICK  
And Furnace Blocks**

DRAIN PIPE &amp; LAND TILE.

Woodbridge. - - - N. J.

A. HALL &amp; SONS, Perth Amboy, N. J.

ESTABLISHED 1846.

HALL &amp; SONS, Buffalo, N. Y.

ESTABLISHED 1866.

**FIRE BRICK**

of reliable quality for all purposes, manufactured o  
the best New Jersey Fire Clays. Also, Architecture  
Terra Cotta, Fire Clay, Fire Sand, Kaolin, Ground Fire  
Brick and Diamantine Building Brick.

**Brooklyn Clay Retort**

AND

**FIRE BRICK WORKS**

Manufacturers of Clay Retorts, Fire Bricks, Ga  
house and other Tile, Capola Brick, &c. Dealers in  
and Miners of Fire Clay and Fire Sand. Clay bank at  
Hurt's Creek, New Jersey. Manufactory Van Dyke,  
Elizabeth, Elizabeth and Partition Sts., Brooklyn, N. Y.  
Office No. 88 Van Dyke St.

**Watson Fire Brick Manufactory**

ESTABLISHED 1856

JOHN R. WATSON, Perth Amboy, New Jersey,  
Manufacturer of

**FIRE BRICK,**

For Rolling Mills, Gas Furnaces, Foundries,  
Gas Works, Lime Kilns, Tanneries, Boiler  
and Grate Setting, Glass Works, &c.  
FIRE CLAYS, FIRE SAND AND KAOLIN FOR SALE.

**HENRY MAUER**

Proprietor of the

**Excelsior Fire Brick & Clay  
Retort Works,**

Manufacturers of FIRE BRICK, HOLLOW  
BRICK AND CLAY RETORTS.

WORKS, Perth Amboy, New Jersey.

Office &amp; Depot: 418 to 422 East 23d St., N. Y.

**TROY FIRE BRICK WORKS**

Troy, N. Y.

JAMES ONTRANDER &amp; SON,

ESTABLISHED 1858.

Manufacturers of

**FIRE BRICK,**

Tuyeres, Tiles, Blast Furnace Blocks, etc. Miners and  
Dealers in Woodbridge Fire Clay and Sand, and Staten  
Island Kaolin.

Established 1864.

**GARDNER BROTHERS,**

Manufacturers of

**STANDARD SAVAGE**

Fire Brick, Tile &amp; Furnace Blocks,

OF ALL SHAPES AND SIZES.

Clay Gas Retorts and Retort Settings,

AND

**Miners and Shippers of Fire Clay.**

OFFICE: 376 Penn Ave., Pittsburgh, Pa.

WORKS: Mt. Savage Junction, Md., and Lockport, Pa.

**BORGNER & O'BRIEN,**

Manufacturers of

Fire Bricks, Clay Gas Retorts,

Retort Settings,

Tiles, Blocks, &amp;c., &amp;c.

23d St., below Vine,

PHILADELPHIA.

Eighteen years' practical experience.

CYRUS BORGNER. WM. J. O'BRIEN

**John Carver,**

MANUFACTURER OF

**CAULKING IRONS,**

Cotton, Freight and Hay Hooks,

No. 288 Monroe Street,

Bet. Jackson &amp; Corlears Sts., NEW YORK.

**TACKLE BLOCKS**

BURR &amp; CO.,

Manufacturers of Waterman and Russell's

Patent Iron Strapped Blocks.

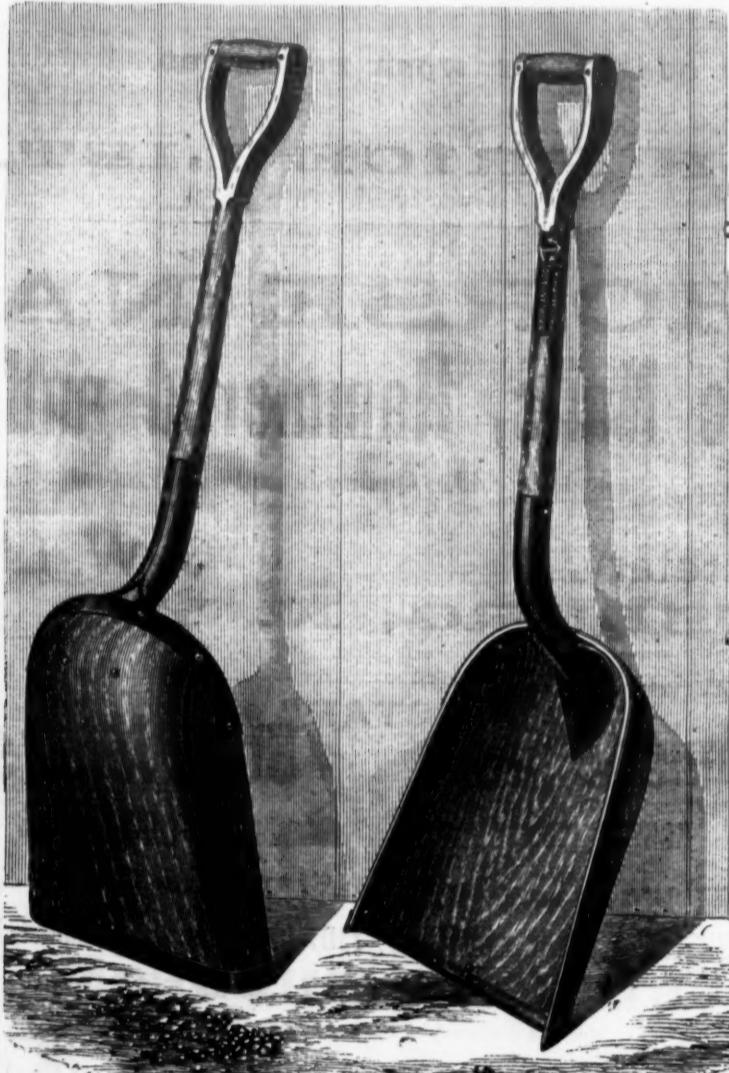
Also, Manufacturers of

**ROPE STRAPPED BLOCKS.**

31 Peck Sts., New York.



**B. ROWLAND & CO.,**  
PHILADELPHIA.



**B. Rowland & Co.'s Patent Wooden  
Blade Grain and Potato Scoop.**

We would call the attention of the trade to the above new article of our manufacture, and to its many advantages over the Steel Blade Scoop heretofore used for the same purpose, advantages which we think are destined to make it of universal use for the shoveling of grains of all descriptions, as well as for potatoes, apples, etc.: First, as to its weight, which is a little more than one-half that of a steel scoop of the same capacity, consequently it can be handled more rapidly and accomplish more work in a given time; second, as to its appearance—it is more slightly, being of a graceful shape, and constant use has the effect of giving the wood a beautiful hard polish, causing it to penetrate the mass of grain readily and deliver its load promptly. It balances perfectly in the hands, is thoroughly braced and guarded with iron at all exposed points, and is fully as strong and in some respects more durable than the steel scoop used for the same purpose. One trial will insure its future use to the exclusion of all others.

**B. Rowland & Co.**   
**CAST STEEL.**

All goods of this brand (which is copyrighted) are warranted in every respect.

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NEW YORK WAREHOUSE, 100 Chambers St.

**The West-bound Freight Pool.**

The representatives of the trunk lines of railway interested in the pool of west-bound freight held two conferences last week in the Windsor Hotel, New York. The gentlemen present at the meetings were: William H. Vanderbilt, president, William K. Vanderbilt, vice-president, and J. H. Rutter, general freight agent, of the New York Central Railway; Hugh J. Jewett, president, and Robert Harris, general manager, of the New York and Erie; Mr. Roberts, acting president, and A. J. Cassatt, vice-president, of the Pennsylvania Railroad; John W. Garrett, president, Robert Garrett, Milton Smith and Anderson Andrews, directors, of the Baltimore and Ohio; and Albert Fink, trunk-line commissioner under the pooling arrangement. The first conference began at 11 o'clock in the morning and lasted until 4 in the afternoon. Every topic of special interest to railway operators at the present time was discussed, but no decision was reached respecting any. The second conference was begun at 8 o'clock in the evening and was not terminated until after 11. When the meeting was over it was stated by Mr. Jewett, who had acted as chairman, that an agreement had been made to continue the west-bound freight pool for five years from Jan. 1, 1879. Commissioner Fink subsequently explained to the reporters that the terms of the pool had been changed in such a manner as to give him almost arbitrary power with respect to the allotment of percentages of freight to the railroads interested.

The pool now in operation is maintained by a contract between the companies, which allows 33 per cent. of freight to the New York Central, 33 to the Erie, 25 to the Pennsylvania and 9 to the Baltimore and Ohio. After January 1 the percentages will be defined by Commissioner Fink. If at any subsequent time one of the companies desires an increased percentage, it will be compelled to make application to the commissioner, presenting at the same time all the facts upon which its claim is based. The decision of the commissioner for or against the claim will be final, and can only be overthrown by a dissolution of the pool. At the present time, if anything goes wrong in the opinion of members of the pool, the work of cutting freight rates is at once begun. Mr. Jewett and Commissioner Fink both said that under the new pooling system rate cutting could not be indulged in. They seemed at a loss to explain, however, how it can be prevented.

The matter of harmonizing action with respect of east-bound freight was also discussed at the conferences, and it was finally decided that the present tariff rates should be maintained by the trunk lines and their connections. It was admitted that the Western roads have been cutting rates, and an arrangement was entered into for compelling those corporations to give up squabbling. Another topic that was warmly discussed was the present warfare about passenger rates between the roads running east from St. Louis to join the trunk lines. No definite action was taken upon this matter. It was referred to the Committee on Rates, composed of Commissioner Fink, J. H. Rutter, of the New York Central; J. H. King, of the Baltimore and Ohio; A. J. Cassatt, of the Pennsylvania; and Robert Harris, of the New York and Erie.

**Vulcanized Fiber.**

One of the most striking instances of the rapid growth of a new industry is to be found in the recent application of vulcanized fiber to an almost limitless number of mechanical uses. Commencing a few years ago with a few experimental applications, it so quickly proved its value that its uses have multiplied almost daily, until at present it meets a wide demand from railroads in particular and manufacturers generally. It is composed of vegetable fiber, reduced to a pulp and so treated as to produce a high class of paper. It is then subjected to chemical treatment, whereby its properties are entirely changed, and a substance results possessing in an eminent degree the qualities of durability and strength. The treatment is regulated at will, so as to produce hard or flexible fiber, according to the requirements of its use. The hard is somewhat like horn in consistency, is very tough and strong, has remarkable durability under friction and remains permanently elastic under all ordinary conditions of weather and temperature. The flexible fiber closely resembles the best English sole leather in appearance, and is largely used as a substitute therefor in mechanical appliances, but is closer grained, more durable, and, being of uniform quality and thickness throughout, cuts without waste. It is largely used in place of rubber for packing. A valuable feature of this substance is its insolubility in hot or cold water, oil, naphtha, petroleum or alcohol, while it is but slightly affected by most acids, and is therefore claimed to be specially adapted for plumbers' washers, &c., car-box and carriage-axle washers, dust guards, oil-box covers, &c., for the following reasons:

It is not affected by oil or grease, does not absorb them or any other fluid except water, the only effect of which, hot or cold, is to cause it to expand and become elastic like leather. It will not stick to anything, and therefore never becomes fast in a faucet like rubber. The washers are said to outwear three or four leather or rubber ones, and always make a tight fit. They are claimed to be cheaper than any other.

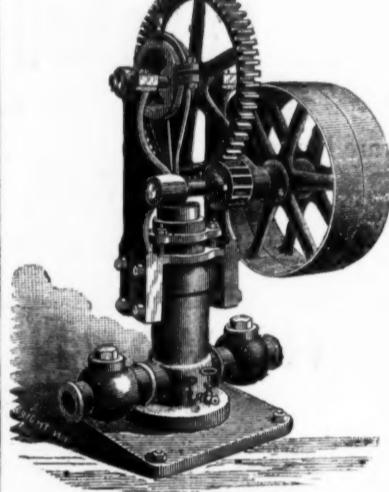
They are used as back straps or packing around car axles, where they enter the rear of the oil boxes to prevent the entry of dust and grit and the leakage of oil. Grit will not adhere to them, and they wear indefinitely. Another large demand comes for them as fish-bolt washers, as they are said to constitute a permanent elastic compensating cushion at the joints of the rails, thereby reducing vibrations and shocks, and also the wear on rails and rolling stock. At the same time it affords one of the cheapest lock-nut arrangements, as the washer sinks into the elliptical hole in the fish plate about 1-32 or 1-16 inch, which prevents turning, and by exposure to the weather the edges of the washer outside of the nut become swollen

and rough, and rising around the edges of the nut hold it firmly in place. This action takes place without any decay or deterioration of the material.

The flexible fiber is made in sheets 42 inches wide by 5 feet 6 inches long and of any desired thickness, from 1-32 inch to 9-16 inch. The sheets are usually halved (21 inches wide) for convenience in shipment. Some other uses to which the fiber is put are as follows: For packing the joints of condenser tubes where they make a tight joint, but permit expansion and contraction through the tube sheets; for journal bearings and bushings, as it has anti-friction properties and is said to outwear brass or Babbitt metal where there is high speed without too much weight, and it requires but half the lubrication; for gibs on engine cross heads, &c.; for electric insulators and in place of hard rubber, as it is much cheaper and superior in strength; for shoe tips, box toes, shanks, counters, heel stiffeners, insoles, &c.; for harness loops, saddles, martingale and napkin rings; trunks, valises, plate chests, &c., and for the carriers in which the messages are placed to be driven through the pneumatic tubes in London, an order for the same having been recently received here by the manufacturers, the Vulcanized Fiber Co., at their factory, Tenth and Walnut streets, Wilmington, Del. Heberton & Co., Walnut street, Philadelphia, are sole agents.

**The "Economic" Boiler Feed Pump.**

Mr. I. B. Davis, of Hartford, Conn., is making a new form of geared boiler feed pump, which he calls the "Economic." These pumps are made in three sizes, the smaller of which has a 3-inch plunger, and will deliver some 800 gallons of water per hour when working at its best rate of speed. The next size has a 4-inch plunger, and delivers 1200 gallons; while the larger size, which has a 6-inch plunger, will deliver 2000 gallons per hour. The highest speed at which these pumps should be run ought not, according to Mr. Davis, to exceed 40 strokes per minute. This gives ample time for the



valves to seat at the end of the stroke, and greatly reduces the shock of working against heavy pressures. Where the main engine from which power is obtained is economical, a geared pump is, without doubt, much less wasteful of power than any other method of pumping, and the saving possible by the use of a geared pump much greater than is usually supposed. The parts of the pump are all made interchangeable, and are designed not only to be durable but to be cheaply manufactured. Flanges on the side of the cylinder carry the framing for the gearing. The journals are all of steel, and the boxes Babbed. The valves are arranged so that by taking out a cap they can readily be removed. The plunger is driven by an eccentric and connecting rod.

**Steel Rails on Canadian Roads.**—The climate of Canada is said to be especially trying to iron rails, so that before the introduction of steel rails the expense for the maintenance of permanent way on the Grand Trunk and Great Western Railways was enormous, and yet the result was eminently unsatisfactory, so much so indeed that when an eminent English railway man—Mr. J. Allport, of the Midland Company—went over the system he pronounced it the most wretched piece of permanent way which he had ever seen in the course of a very extensive experience. The London Mining Journal gives some valuable data illustrating the utility of steel rails in reducing the maintenance charges of the Great Western Railway of Canada. In the year ending July 31, 1874, the outlay for maintenance purposes on this system was £395 per mile; in the year ending July 31, 1875, £307 per mile; and in the year ending July 31, 1876, £232 per mile. It will be seen that there was a marked and progressive decline in the expenditure during the two latter years. But the reduction had not by any means acquired its full development. In the year ending July 31, 1877, the maintenance outlay made was only £193 per mile, and in the year ending July 31, 1878, it still stood at only £166 per mile. The great decrease effected in the expenditure on permanent way was rendered all the more remarkable by the fact that of late the outlay for sleepers has increased. This arises from the large number used and the higher price paid for them. This higher price is due to the growing scarcity of suitable timber in Canada, and to the greatly augmented demand for it, owing to the requirements of the numerous railways constructed in Canada within the last few years, as well as of those in course of establishment. This makes the reduction in the permanent way expenditure of the Great Western of Canada all the more satisfactory. The directors, we may add, report that although the cost of maintenance has been reduced, the condition of the permanent way continues excellent.

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## Plantsville, Conn.,

Manufacturers of the

# BEST QUALITY CARRIAGE MAKERS' HARDWARE.

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PRICES LOW FOR QUALITY OF WORK FURNISHED.

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The Saranac Nails are hammered hot and the finishing and pointing are done cold. Quality is fully guaranteed. For sale by all leading iron and hardware houses.

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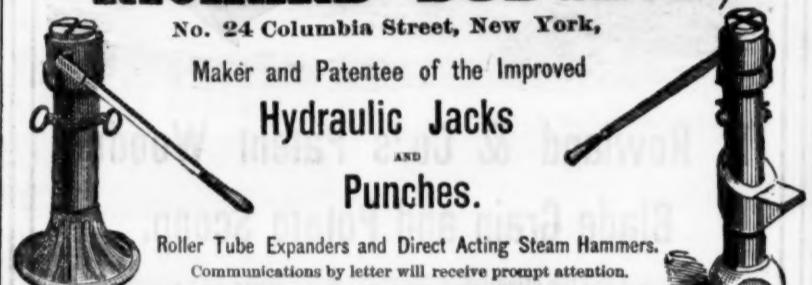
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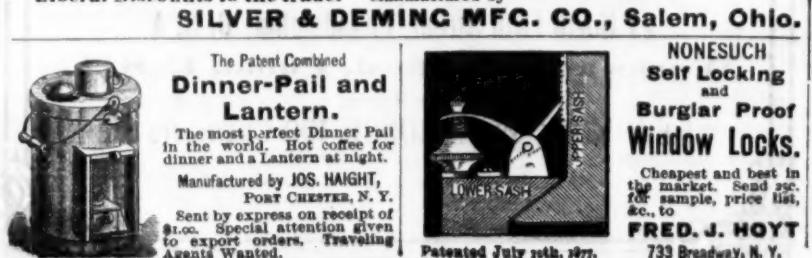
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**Old Homes Made New**



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**NELSON LYON,**  
SOLE MANUFACTURER OF  
**LYON'S PATENT**  
**METALLIC HEEL STIFFENERS**

Albany, N. Y.

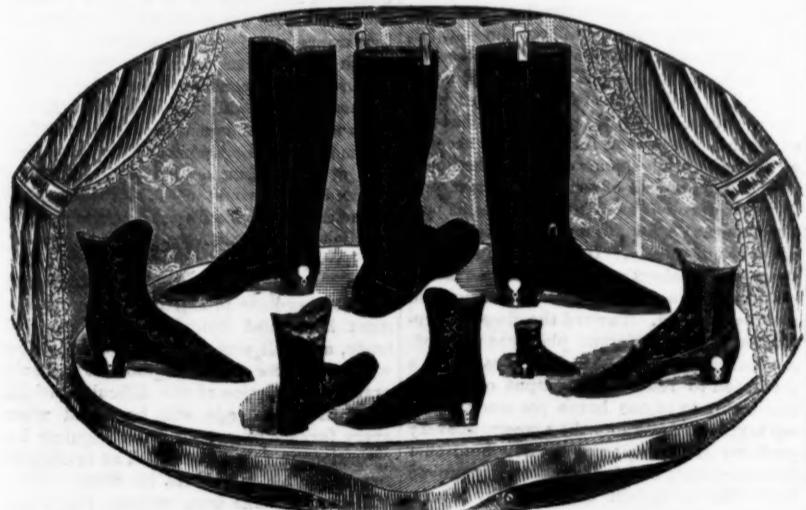


Old Boots and Shoes can be Straightened

AND  
NEW ONES KEPT STRAIGHT

BY USING

LYON'S PATENT METALLIC HEEL STIFFENER.

These can be applied to any Boot or Shoe at any  
time by any one.

Every Pair is warranted to bend to fit the boot without breaking.



All Boxes must be marked. Manufactured only by NELSON LYON, Albany, N. Y., under Patents of July 9, 1872, May 18, 1875, July 11, 1876.

Send for Catalogue.

NELSON LYON.

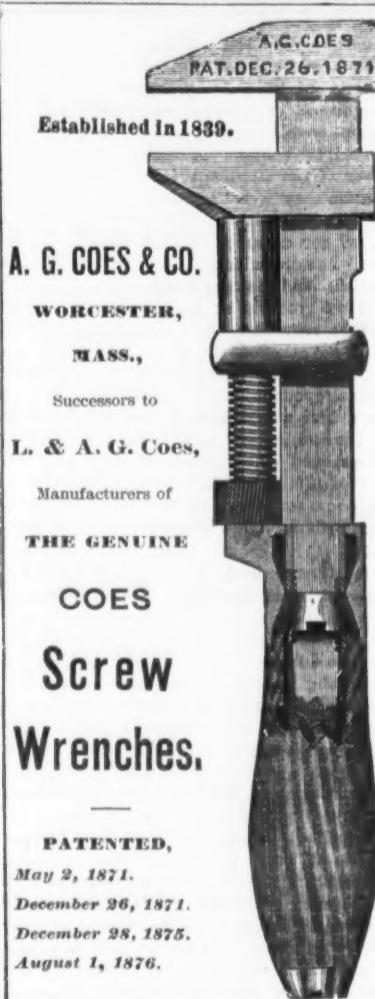
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Albany, N. Y.,  
SOLE MANUFACTURERS OF THEVICTORY  
Combined Snow Shovel  
and Ice Pick.

Manufactured under Patents of July 9th, 1877.

May 7th, 1878.

As seen in the accompanying cut, the handle can be taken from the blade by throwing back the cam lever which holds it. On the end of the handle there is a steel point which makes a good Ice Chisel.

Catalogue sent on application.



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May 2, 1871.  
December 26, 1871.  
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The back strain when the wrench is used is borne by the bar—not by the handle.  
The strongest Wrench made, and the only successful Re-enforced Bar.  
None genuine unless stamped

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New York, carry a full line of our goods, and will be  
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Hawing Beetles, Hawing and Calking Irons;  
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## THE PARIS EXPOSITION.

Great Britain and Her Colonies.—III.

(From our Special Correspondents.)  
B. 3, American Section Exposition Universelle,  
Paris, Nov. 25, 1878.

The Phosphor-Bronze Company (Limited) of London exhibit 21 pieces of every description made of this alloy. As our readers are aware, phosphor-bronze is, as its name implies, a combination of copper, tin and phosphorus in definite proportions. The great advantage claimed for it is that by varying the proportions of its constituents it can be made more ductile than copper, as tough as iron, or as hard as steel; that in its manufacture the ductility, hardness or elasticity can be regulated with perfect accuracy, and that it can be remelted without any material loss or alteration of its qualities. The Phosphor-Bronze Company produce several grades of this alloy. The list of these, with their chief applications, is somewhat lengthy for our columns. Nettlefolds, under the names of the Castle Iron Company and the Imperial Wire Company, have an important exhibit of all varieties of screws, bolts, rivets, nuts, wire brads, nails, staples, &c., and various sorts, sizes and sections of bar and rod iron and wire. Their range of sizes for wire is from No. 6/0 (or .5 inch diameter) to No. 30 (or .010 inch diameter). Nettlefolds also make a large quantity of all kinds of rivets, plugs and pins used in boot and shoe making, panel pins, coach pins, &c., and staples for fencing and telegraph wire. The total capacity of their wire-drawing mill is over 250 tons weekly. The plant of the Castle Iron Company consists of three mills and 28 puddling furnaces, capable of producing about 600 tons of finished iron per week. Nettlefolds manufacture three brands of bars and rods. Their sizes are from 3 inch by 1 inch flats, and 1 1/4 inch rounds and squares to 1/2 inch, and all sizes of wire rods and rolled fencing wire. Samples of their iron, broken and twisted in various ways, are on view in their show case. T. & C. Clark & Co., Shakespeare Foundry, Wolverhampton, have an exhibit of porcelain-lined ware.

Fraser's type composing and distributing machine is worth stopping to look at. It is practically one machine, which serves both as composer and distributor—one portion doing the composing and another distributing—so that the page of type, when printed off, may be distributed directly into the trays of the composer. The machines are worked by keys marked with the different letters of the alphabet, and the operator has only to depress the corresponding key to set or distribute the letter required. The keys most in use are placed within a few inches of each other, and it is claimed that a practiced operator can set or distribute from 10,000 to 12,000 types per hour. Each machine can set or distribute for four or five sizes of type, those exhibited being suitable for small pica to minion inclusive. The construction is such that the matter is always under the eye and close to the hand of the operator, so that any mistake made in composing or distributing can be at once corrected. The page or column as it comes from the press is placed upon the distributing galley, and by pressing the corresponding keys the type is distributed and set up in columns, face up, in grooved trays, each kind of letter by itself. Each tray contains 24 different letters, and when filled has only to be transferred to the stage of the composer.

The Rider engine, of which a description is quite superfluous in these columns, is exhibited by its London makers, Hayward, Tyler & Co. The same firm have a "Universal" steam pump, in which they have employed a small "Universal" steam cylinder to act as slide valve to a much larger cylinder. This small cylinder is placed upon a large cylinder and contains a piston which, when set in motion by an interior slide valve, constitutes the slide valve of the large engine. In order to regulate the admission of the steam, there is a small opening at each extremity of the principal cylinder. As soon as this opening is uncovered by the piston passing over it, the small slide valve is forced back, and steam is admitted to one end or the other of the universal piston, sets this in motion, and is thus admitted to one extremity of the principal cylinder and emitted through the other. On account of a peculiar disposition of the small admission orifices, the piston encounters a steam cushion at the end of each stroke, and shocks are avoided. Rider's hot-air engine is shown in operation in a small annex close to the British section.

Louis Simon & Son, Nottingham, England, have on exhibition two gas engines, representing the two classes of machines constructed by them. The first is a vertical motor, "The Nottingham Vertical" they call it. In this the crank receives its motion directly from the piston rod. The machine is quite compact. No water is employed to cool the cylinders. The makers claim that only three-quarters of a cubic meter of gas are employed per horse power per hour. They make three sizes of this engine of two-thirds, one, and two and a half horse powers respectively, the second of which is alone exhibited. The second engine exhibited, "The Nottingham Eclipse," is a one-horse-power horizontal engine. In this motor a mixture of air, compressed gas and steam are employed for producing the motive power. This machine, like the preceding, is constructed in three sizes, these being one, two and five horse power.

A patent grooveless tramway system is exhibited by its inventor, Charles Allerton Edges, of Birmingham. In this system the rails are provided with a series of equidistant round or oval holes through the top part or plate, the wheels being supplied with corresponding projecting studs of conical shape, either round or oval at their base. These studs are so arranged that as the vehicle travels they enter the holes on the rails, and thus keep the wheels on the track much more effectually, it is claimed, than the flanged wheel and grooved rail now in vogue. The rail may be laid perfectly flush with the surface of the roadway. For the purpose of receiving the

natural accumulation of dust and dirt falling through the holes, and the fragments of stones or other such obstacles which might be wedged in the holes and crushed by the weight of the car, the rails are fixed on cast-iron chairs, placed over a hollow foundation, forming a continuous chamber connected at intervals with the sewers, and thus also forming a channel for the removal of surface water from the roadway.

Hadfield's Steel Foundry Company, Attercliffe, Sheffield, exhibit various pieces made of their crucible cast steel. Some of the more important pieces are car wheels, frogs, gear wheels and various parts of machinery. The Leeds Forge Company have a patent corrugated boiler furnace flue, with coned flue tubes and expansion rings, some locomotive cranks, &c., of Yorkshire iron, and specimens of their iron bent and twisted cold and broken to exhibit the fracture. Wm. Jessop & Sons make a large display of steel, including numerous grades, from boiler plate and plow steel to pen steel. Jefferson Read has various objects of steel, and wrought, cast, malleable and wrought iron. Close by this are numerous other exhibits of iron and steel, of which our limited space will not admit a complete examination.

In the exhibit made by Brown, Bayley & Dixon we find a drawing of an apparatus for utilizing the heat generated in Bessemer steel converters. The gases evolved in the converters, diffusing themselves in the top of the stack or chimney, enter a stove containing a series of pipes, through which the blast for melting pig iron is forced. The passage of the hot gases through the stove is regulated by means of two dampers.

The Devon Great Consols Co., London, exhibit some stones of yellow copper ore, extracted from the lodes and other parts of the workings in their mines, situated near Tavistock, in Devon county; and also specimens of arsenical muriatic, broken from the lodes in the said mines, and from which the white-powdered arsenic of commerce is manufactured, some samples of this being likewise exhibited in two bottles.

## Miners' Wages in the Scranton District.

The Scranton Republican says: Believing that witnesses before the Hewitt Committee, at its recent session in this city, had greatly understated the wages paid for mine and other labor, we have procured from the Lackawanna Iron and Coal Company interesting facts and figures upon the subject, which we give herewith. We have chosen this company because, as is well known, it has always been represented by labor leaders and labor organizations as the most oppressive in maintaining the lowest scale of wages of any in this region. The accompanying tables disclose exactly the condition of its employees as being far from the pitiable character represented to the Hewitt Committee. If the charge is true that the Iron Company is less just or generous to its labor than other corporations, it must also follow that employees of other companies are doing proportionately better. The facts are, however, that in the matter of mine labor the Iron Company's wages are based upon those paid by the large railroad companies here, and are therefore valuable as indicating the condition of that industry in this region. We believe the Iron Company's men are not only contented, but reasonably prosperous, at this time—a creditable record for its management. If miners in collieries of other corporations are not thriving equally as well it is due solely to the fact of their not having constant employment, which in many cases we believe is the fact. Work is more steady throughout this region now than it has been, and will continue to be so until the end of the year at least. It is hoped and believed that another season will be still more active and profitable, and will bring a return of prosperity to all classes of our people:

TABLE NO. 1.—MONTH OF OCTOBER, 1878.

Total number of men and children on October pay rolls, exclusive of superintendents and clerks.	1,441
Total wages of above.....	\$51,425.67
Total cash paid to above 1,441 men and children, as per pay rolls, after making all deductions for rent and supplies of every description furnished by this company from their various departments, such as store goods, flour, feed, &c., coal, lumber, wood, brick, lime, &c.....	35.58
Average per hand.....	32,390.85
Total number of children and minors.....	22.47

TABLE NO. 2.—MONTH OF OCTOBER, 1878.

Cuphouse and Pine Brook Mines.	
Total wages of 471 men and children, miners' wages computed net, deducting help.....	\$14,274.92
Average per head.....	30.39
Total earnings of 120 miners, exclusive of help.....	6,714.46
Total earnings of 123 miners' helpers.....	3,175.18
Average per miner.....	25.95
Average per miner's helper.....	25.81
(Miners' average above includes oil, powder, soap, &c., so far as furnished by the company.)	
3 miners earned over.....	\$100.00
4 miners.....	80.00
5 miners.....	70.00
6 miners.....	60.00
7 miners.....	50.00
8 miners.....	40.00
9 miners.....	30.00
10 miners.....	20.00
(All above exclusive of help.)	
6 miners' helpers earned over.....	40.00
7 miners' helpers.....	30.00
8 miners' helpers.....	20.00
9 miners' helpers.....	15.00
10 miners' helpers.....	10.00

(Miners' average above includes oil, powder, soap, &amp;c., so far as furnished by the company.)

3 miners earned over.....

4 miners.....

5 miners.....

6 miners.....

7 miners.....

8 miners.....

9 miners.....

10 miners.....

11 miners.....

12 miners.....

13 miners.....

14 miners.....

15 miners.....

16 miners.....

17 miners.....

18 miners.....

19 miners.....

20 miners.....

21 miners.....

22 miners.....

23 miners.....

24 miners.....

25 miners.....

26 miners.....

27 miners.....

28 miners.....

29 miners.....

30 miners.....

31 miners.....

32 miners.....

33 miners.....

34 miners.....

35 miners.....

36 miners.....

37 miners.....

38 miners.....

39 miners.....

40 miners.....

41 miners.....

42 miners.....

# The Iron Age

AND  
Metallurgical Review.

New York, Thursday, December 12, 1878.

DAVID WILLIAMS . . . . . Publisher and Proprietor.  
JAMES C. FAYLES . . . . . Editor.  
JOHN S. KING . . . . . Business Manager.

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The East River Bridge is in a bad way. The Board of Trustees have not been able to get together a quorum for three months. The receipts of the treasurer of the company last month amounted to only \$3921.36, most of which was for rents. The expenditures amounted to \$40,549.10. The cash remaining on hand is \$29,264.95. The existing liabilities are \$130,000, and these are daily increasing. The total receipts thus far have been \$10,106,251.60; the total expenditures, \$10,076,986.65. Of the amount received Brooklyn has contributed \$6,878,966.67, and New York \$3,000,000. Laborers have been rapidly discharged within a few weeks past, and now work has been suspended for the winter on the masonry in Brooklyn, and the masonry on this end is being put into shape to protect it from the weather. There are about 150 men remaining in the employ of the bridge, and most of these are engaged in wrapping the cables. Unless the legislature shall do something to relieve the Board of their present financial embarrassments, the work will have to be abandoned for the time.

### Design Patents Again.

The decision of Judge Blatchford, denying the application of Perry & Co. for a preliminary injunction restraining the further unlicensed manufacture and sale of two base burners said to infringe the "Argand" design patent, is of much importance to all classes of manufacturers. As in our article of October 31st, on Judge Wheeler's decision affecting the "Hecla," we shall consider Judge Blatchford's ruling only in its bearings as a legal precedent. With the merits of the case to which Judge Blatchford gave hearing, we shall try to concern ourselves as little as possible.

It will be remembered that Judge Wheeler, in the decision rendered by him some weeks ago, and upon which the injunction affecting the "Hecla" was granted, took broad and advanced ground in interpreting the law of design patents. He held, in effect, that a design was a novel combination of shape, form and general configuration—an arrangement of parts which gave an original character to the article of manufacture, and which, taken together, constitute its identity. His specific ruling was as follows:

"Whenever a valid patent for a design is granted, any unlicensed article which, by reason of its resemblance in external appearance to the patented design, is calculated to deprive the patentee of any part of that market which the patent was intended to secure to him exclusively, is an 'unlawful invasion of his rights.'"

This ruling, so far as we can learn, was acceptable to both parties. It gave a definite value to a design patent, and not a few of the leading members of the Anti-Clinker Association expressed themselves as gratified that the law had been so clearly defined. "If this be the law," said a leading manufacturer of stoves, "it suits us perfectly. We know now just where we stand, and what our design patents are worth. It shows us that we have some rights which are valuable in the fruits of our skill and industry, and which we can enforce." This, we believe, was the sentiment of the trade at large.

Judge Blatchford's decision on the application for an injunction against other stoves alleged to infringe the "Argand" design patent, reopens the whole question, and makes the value of a design patent as much a matter of uncertainty as it was before Judge Wheeler rendered his opinion. This is not so much because he decided that, in the case of the two stoves named by the complainants, there was not enough resemblance to the "Argand" to constitute an infringement, as because of the ground upon which his opinion was based.

Noting certain differences in ornamentation, illumination and minor differences of construction, he held that these differences were so evident that the most casual observer "outside of a lunatic asylum" would never mistake the one for the other. Testimony undertaken to show that the essential features, shape, form and configuration of the "Argand" stove was common to both the stoves named by the complainants, seems to have had no weight with the court. The differences which attracted the eye and served to distinguish one from the other when placed side by side, appear to have been the only points considered; and the decision was rendered in strict accordance with the letter of the decision of the Supreme Court in the Gorham case, although Judge Blatchford seems to have had a less accurate conception of its spirit and logical results than was shown by Judge Wheeler.

Now, we do not undertake to express any opinion as to whether the two stoves named by the complainants do or do not infringe the "Argand"; but do say without hesitation that the grounds upon which Judge Blatchford decided that they do not infringe are unsatisfactory, and that his decision, whether it be deemed just or unjust, destroys entirely the value of design patents and annihilates all the benefits which we hoped would result from Judge Wheeler's decision. Had Judge Blatchford, after a careful examination of the stoves, drawings and photographs entered as exhibits by the opposing counsel, decided that there were differences between the "Argand" and the alleged infringing stoves which involved radical changes of form, outline, configuration and general character, we should have accepted it as satisfactory. But as we understand the decision, it was given on the ground that there were such differences in the appearance of the stoves in question as would be apparent to the casual observer; consequently, as one would not be mistaken for the other or the patterns for one could not be used in the production of the other, there was no infringement. Every manufacturer knows that, with as large a liberty as this to imitate, a design patent has no value further than to prevent such close copying that the imitation shall be mistaken for the original by ordinary observers. The plates of a stove covered by a design patent could not be used to cast another stove, nor an ornamental casting be reproduced literally without infringement; but, according to Judge Blatchford's ruling, an idea may be copied in all its essential features, or a design be boldly pirated, provided care is taken to introduce such minor changes as shall be distinguishable upon comparison.

We have followed the progress of these suits with great interest, not because we have any concern as to which side shall win, but because we recognized the fact that the

decisions rendered must be fraught with momentous consequences to American industry, perhaps for years to come. The magnitude of the interests involved, the exceptional ability of the counsel employed, the voluminous and exhaustive character of the testimony taken, and the attention they were entitled to claim in the courts, made them *causes célèbres*, and called for decisions which would long be quoted as precedents. That Judge Blatchford decided the case heard by him so hastily and on grounds so unsatisfactory, cannot but be regretted even by the defendants. Had he reached the same conclusions on broader, more comprehensive and more logical grounds, even those who differed from him would have been satisfied; as it is, the satisfaction of the defendants must be qualified by the knowledge that, by reason of Judge Blatchford's decision, they have lost something of substantial and real value which Judge Wheeler's decision gave them.

It is but natural that in cases involving large interests there should be bitter feeling, and that both contestants should be willing to sacrifice principle for the sake of a favorable decision. Is it not practicable and desirable, in view of the immense importance of securing a broad, liberal and comprehensive interpretation of the law of design patents, from which there can be no appeal and which shall simplify or avert future litigation, for the parties in interest to make a test case which can be tried without feeling and appealed to the Supreme Court at once by arrangement between counsel? There is not a manufacturer in the country who makes goods which can be covered by design patents who is not vitally interested in knowing what a design patent is and what constitutes an infringement. Our industrial progress demands increased skill in our designers, and the brain labor which gives us new designs is as much in need of protection against unlicensed piracy as the mechanical talent which gives us phones and improvements in steam engines—more, indeed, for while we lead the world in mechanical progress, we are barely beginning our career as a nation of art workers, and our only hope for success in this direction is to give the artist as much protection as is given to the inventor in any other field of study and labor.

Will Our Favorable Trade Balance Bear Analysis?

The real significance of the large balance of trade in our favor is not to be found in the totals, however gratifying to our pride it may be to know that \$257,786,964 represents the excess of net exports over net imports of merchandise for the fiscal year 1877-8. The meaning of this balance cannot be determined by a sum in subtraction. It can be known only by a patient study of details. There are balances that seem favorable, but investigation shows them to be evidences of poverty and decay. If the details of our exports and imports show that this balance has come from a decline in imports, and of such imports as indicate that we have been compelled to retrench even in our comforts, it certainly is not a source of gratification, as it proves a state of affairs that is anything but satisfactory. On the other hand, if we find these items holding their own, and at the same time find a decline in the imports of certain manufactured articles produced in this country and an increase in the export of other articles either manufactured or produced here, it would be a most gratifying indication.

In analyzing our imports and exports it is well to take a group of years, to avoid errors from deficient crops and stocks on hand, and to give a fair range of prices we have taken the fiscal years 1877-78 and 1876-78. The first group shows the three years immediately before the panic, and the last the triennial just closed. Our total net exports and imports of merchandise for these years are as follows:

	Total net imports of Merchandise	Total net exports of Dom. Mds.
	Tons.	Tons.
1871	\$205,802,414	\$42,398,003
1872	610,904,622	48,487,131
1873	624,659,727	50,033,439
Total	\$1,341,359,763	\$1,361,919,478
1876	\$445,028,766	\$52,582,247
1877	439,518,130	52,670,224
1878	422,806,834	68,683,798
Total	\$1,307,351,730	\$1,705,936,569

In these triennials it will be noticed that the totals of imports and exports have about changed places. The imports have decreased 26 1-5 per cent. and the exports increased 35 6-13 per cent. Instead of the imports being 26 4-5 per cent. in excess of the exports, the latter in the last triennial are 26 6-7 per cent. in excess of the former. The two imports that come nearest to being necessities of life are tea and coffee, and if our imports have fallen off from poverty it should show in these. Taking the imports for the corresponding years, for which we have given the totals, we have the following:

	Coffee.		Tea.	
	Pounds.	Value.	Pounds.	Value.
1871	37,928,018	\$30,092,869	51,364,016	\$17,234,617
1872	298,805,946	17,942,395	52,811,003	25,943,575
1873	293,207,277	44,100,671	64,815,130	24,460,170
Total	910,005,265	\$153,044,765	179,900,151	\$64,604,365
1876	339,789,246	56,788,397	69,827,153	19,524,766
1877	331,639,793	53,634,991	58,347,113	16,182,467
1878	309,882,540	51,914,605	65,360,704	13,660,158
Total	981,331,509	\$162,338,593	186,600,960	\$51,365,80

Considering the increase in population, it will be observed that the consumption of these articles has not fallen off. An exam-

ination of the imports of such articles as cocoa, sugar and spices—luxuries in one sense—will lead to the same results if we consider the circumstances, especially in reference to the last two articles. Our sugar crop has largely increased in Louisiana, and the maple-sugar crop has been constantly growing. Our imports of tin—an article not produced in this country to any appreciable extent, one which enters into consumption in every household and in which some economy must be exercised—have increased in these years nearly one-fourth. The great reduction in price may have something to do with this, but even allowing for this, the imports have largely increased. In a word, while our total imports have fallen off nearly 27 per cent., these articles have increased, or at least held their own. This certainly shows that the balance of trade is not due to such poverty among our people as to prevent their indulgence in the luxuries that come from abroad and that cannot be procured here.

If we compare our exports and imports of certain articles manufactured in this country, we shall be still more impressed with the idea that this large balance to our credit is really favorable. Take cotton goods for example. In the first triennial, 1871-73, we imported in round numbers \$83,000,000, and in the same time exported \$8,500,000. In the last triennial we imported only \$47,500,000 and exported \$29,000,000, a decrease of more than 40 per cent in imports, and an increase of more than 300 per cent. in exports. Our exports of leather and all manufactures of the same have increased from \$10,500,000 to \$26,000,000, while our

ticle on the subject, in which it is claimed that the Canadian hematites and magnetites could be profitably smelted with American anthracite, Nova Scotia coke or Canadian charcoal, and that instead of importing, as in the year 1877-'78, \$245,124 worth of wire, \$1,456,400 worth of machinery, general hardware, cutlery, &c., a protective tariff might foster a great industry in producing them at home. It is stated that already new life is given to iron interests; that the Ottawa Iron Works are bestirring themselves and adding fresh capital for commencing operations; that Port Hope is applying for a charter to erect blast furnaces, and that the rolling mills at Hamilton will soon be in order. Whether our neighbors will be successful under present conditions time will soon show, but we fear that they are deceiving themselves when they make such statements as the one that 50 per cent. magnetic can be laid down at Toronto at \$2 a ton.

The unparalleled depression of the iron industry in England is causing a searching inquiry into its causes. Thus, we find the large corporations, railways, &c., as well as the government arraigned for the establishment of manufacturers of supplies. It is argued with much force that even if an economy is the result of a successful attempt on the part of railroads to make their own pig and roll their own rails, tiers, &c., the wisdom of adding to the responsibilities of the management is questionable. It is stated with confidence that the effect is often positively disastrous; that the cost of price is beyond that of the price in the open market; that through fear of allowing plant and machinery to remain idle supplies are manufactured for which there is no immediate or even prospective demand, and that the system leads to loss by a number of superfluous odd jobs and premature renewals. There are many instances in which these causes and the insufficient or improper management of such accessory manufacturing establishments do much harm, in two ways: They injure the interest of the shareholders, and they introduce a peculiar element of competition into a trade, which, if left to its own regulating influences, would be able to furnish supplies at a lower rate with reasonable profits to private enterprise.

In a recent speech in the House of Commons Lord Beaconsfield spoke as follows with reference to the business outlook: "The recent words of the President of the United States, coming from such a quarter on such a subject, cannot be treated with too much consideration. Enterprise in America acts on that of England. I look forward with much confidence to the influence of American industry and enterprise shortly producing more favorable results than we can now estimate." These are strange words for a Tory Premier to utter in Parliament. Mr. Gladstone entertains these sentiments we are sure, but we should have supposed that would be just the reason why Lord Beaconsfield should have thought otherwise, or at least have spoken otherwise.

#### NEW PUBLICATIONS.

OUTLINE OF THE GEOLOGY OF ALABAMA. By Eugene A. Smith, Ph. D., State Geologist. The geological structure of the State of Alabama has been the subject of much earnest and persistent research since the year 1847, when Prof. Thomey began his first systematic examination, which was continued after his death by Prof. Mallett. After the war Prof. Eugene A. Smith continued the field work and the publication of reports, the result of his labors since 1873 being three annual reports of progress. The work before us was written for, and is embodied in, Berney's Hand-book of Alabama. Prof. Smith has succeeded admirably in presenting a clear sketch of the geological structure of the State, which an introductory chapter of general explanation of technical terms will make accessible to all. Geologically, Alabama may be divided into three tolerably well-defined divisions—the Northern, Middle and Southern. The chief formations constituting the soil of the State besides the metamorphic region are the silurian and devonian, the subcarboniferous, the coal measures, the cretaceous, tertiary and more recent deposits. The resources of the metamorphic region seem to be but little explored beyond a few gold mines and numerous indications of manganese ores, magnetites, hematites and limonites. It is in the silurian deposits, the Knox shales and dolomites that the inexhaustible beds of limonites of Calhoun, Talladega and Shelby counties are found. The same ore is also abundant in the lower portions of the territory which covers the southern portion of the State. The coal measures of Alabama extend over an area exceeding 7000 square miles, which constitute three fields, called the Warrior, Cahaba and the Coosa, after the streams which drain them. The two latter are separated from the former by a series of anti-clinal silurian valleys. The Warrior field contains 46 seams of coal from 1 inch to 6½ feet in thickness, of which 16 are considered workable, being over 2 feet in thickness. Three or four of these, the Newcastle, Morris, Black Creek and Pierce beds are being worked, the Black Creek furnishing excellent gas coal. The Cahaba field has 16 workable seams, of which some yield good steam coal while others coke well. As yet the Cahaba, Wadsworth, Buck, Black Shale, Beaver Dam and Helena seams only have been worked to a limited extent. But very little is known of the Coosa field, beyond the fact that there are at least three beds of coal of workable thickness. As far as surface indications and limited developments can justify statements as to the mineral resources of a region, the northern and middle portions of the State of Alabama are abundantly endowed by nature and possess

all the materials upon which a prosperous industry may be built up. Much can be learned from the work before us on the subject of the resources alluded to, and it will be a welcome addition to all to find the main geological configuration of the State laid down in a finely executed map.

#### CAN THE PRODUCTION OF PIG IRON BE LIMITED?

To the Editor of *The Iron Age*: In your last issue you copy from the Iron and Steel Association *Bulletin* an article urging the need of some immediate action to relieve the present wretched condition of the pig iron market and its producers, the outline of which is as follows:

"It is provided for, 1. A general board of control, composed of representatives from all the pig iron regions, as grouped in the published list of the American Iron and Steel Association; the Lehigh region constituting the one, the Schuylkill another, and so on. 2. A local board for each region. 3. The producers of each region to be bound to limit the production to the legitimate demand. 4. When the output in any region exceeded the sales for a given period, the producer making the most iron to his aggregate capacity to first put out a furnace. 5. A reasonable modification in favor of those producers having only one furnace."

You remark regarding this as follows: "We are not prepared to discuss the scheme [for limiting the production of pig iron] without a clearer idea of how it is proposed to form a combination of producers which shall last the temptation to take advantage of the first advance in price and make iron without reference to the orders of the Board of Control."

Self-interest would prevent any such violation of the pledge of membership, even if their plighted honor and obligation of such membership could not be relied on; but with men occupying stations as important as those who control and manage our great iron works there ought to be no apprehension on this point. I feel assured that in the Lehigh region every producer who would sign the pledge of membership would loyally adhere to all its requirements for and during the time agreed upon. The deplorable condition of the market for the past several years, with no visible signs of improvement, should of itself be a sufficient restraint to prevent any action tending to defeat the maintenance of prices at living figures. There would, however, be several methods available for imposing such penalties as might be approved. This is a matter of detail, and each region would best know its own members and could impose such additional obligation as might be thought necessary. But the most important question is, What would be the effect of the acceptance and adoption of the plan? If it would not be remedial and mutually advantageous, it would be useless. If it would work advantageously, self-interest would assure its maintenance for at least a stipulated time. In order to examine its probable effect, let us suppose the acceptance and organization complete. What would result? The fourth item of the plan provides that when the output in any region exceeds the sales for a given period the producer making the most iron in proportion to his aggregate capacity shall first put out a furnace. The productive capacity of the several furnaces is known and published from year to year. The quantity of iron sold from month to month is readily ascertained, so that when more iron is made than is sold the local board of control would have accurate and reliable knowledge of it. Now, is it not reasonable to suppose that any producer would refuse to sell his product for less than actual cost when assured, as he would be with such an organization, that a restricted output was certain to bring him at least cost for his iron within a few months at furthest? and it is believed that the simple completion of such an organization would immediately restore prices to actual cost of production. The present ruinous condition of the market does not increase consumption or benefit consumers. As much iron would be used at an average of \$18 per ton at the works as is now used at an average of \$15 per ton. Consumers would have no occasion to fear an advance beyond a reasonable price, for whenever the sales for a given period exceeded production the producer making the least iron to his aggregate capacity would be entitled to put in a furnace; the incentive to blow in being great, production would be kept full up to consumption. And I may say here that the scheme cannot be regarded as one for extracting profits from the making of pig iron, but simply as a means of preventing serious, and in many cases ruinous, losses. The present cost of a ton of pig iron in the Lehigh region (and it is doubtful if it can be made for less in any competing region) is from \$18 to \$19, allowing interest on the amount of capital now required to build, equip and run a furnace, and an amount sufficient to relieve it and replace the boilers, hot-blast engines and other equipments when worn out. Without an allowance for interest as above the actual average cost is from \$17 to \$18 per ton on the furnace bank. The monthly business statements may show net cost at \$15.50 to \$16.50, but in this there is no allowance for refining the furnace, replacing worn-out hot-blast ovens, engines, boilers; reasonable percentage for losses, &c., or for interest on capital employed, which are as properly elements of cost as are coal, ore, &c. When I speak of average cost I include white, mottled, gray forge and Nos. 1 and 2 foundry. These grades of iron are now being sold at an average of \$14 to \$15 at works, and the price has so ruled for a year or more. Or, stated in other words, No. 1 has been selling at the works from \$16 to \$16.50; No. 2 at \$15 to \$15.50; gray forge, \$14 to \$14.50; mottled, \$13.50 to \$14, and white, \$13 to \$13.50, and in special instances at still lower figures where the need to realize was pressing. To these prices add about \$1.50 for freight, handling, &c., for delivery in New York and Philadelphia. This statement is sufficient to show the extreme urgency of the situation, and unless relief be had there is danger that the larger part of the capital invested in these great industrial works may be sunk if they continue producing at

these rates, for it is impossible to materially further reduce cost. To those who are unacquainted with blast furnaces and the making of pig iron, the question will be asked, Why, then, continue to produce? The answer is, there are many reasons known and understood only by those acquainted with the business, but independent of these reasons many producers have preferred to suffer loss and retain their custom rather than stop and allow rivals to secure their trade, hoping and trusting in the meanwhile that time would soon bring about a change for the better.

What the pig iron interest needs and has is an able and intelligent journal to lead the way, to discuss the necessities of the situation and point out the remedy which may offer the best hope for relief. This great interest, embracing an invested capital of many millions of dollars, is absolutely without an organization and without a journal to advocate or present for consideration a means of relief.

The suspension of the Allentown Iron Company has resulted from no bad management, other than selling iron to-day and paying more for it themselves in the cost of producing it to-morrow. As they kept in operation all their five furnaces they made more iron and sustained in consequence heavier losses than any of their neighbors, and were sooner pushed to the wall. It was said by one of the principal managers of the largest producers in this region: "All must follow the same road unless some relief comes in better prices." Those who have stood idle much of the time since the panic, or were out of debt and had a surplus in reserve, will no doubt "weather the storm," if it does not last too long, but will suffer damages more or less severe according to its duration.

And why should not your great journal take up the subject, discuss it, invite others to do so, and try to save this great industry from the threatened ruin which now overhangs it. Its destruction will almost fatally impede the development of the great natural resources of our country. It will be many years before capital will venture in similar investments. Any successful efforts put forth therefore to save it from ruin will be a substantial benefit to the future growth and prosperity of the country, in addition to affording the immediate relief so much needed by all producers of pig iron.

Many journals came nobly forward in support of the need of some arrangement to restrict the output of coal, and it is now everywhere recognized that it was an absolute necessity to save that interest from ruin. Yet it is doubtful if that interest was as bad a condition at any time as is the manufacture of pig iron now.

If you will lead the way others will follow, and especially the journals in the iron producing regions who are more immediately interested.

W. H. A.

#### METALLURGICAL NOTES.

##### THE TREATMENT OF MIXED GALENA AND BLEND.

We are indebted to Messrs. Jos. Binon, of Stolberg, and A. Grandfils, manager of the Membach works, for a copy of their pamphlet "On the Improvement of the Processes of Manufacturing Zinc" (*Etude sur l'amélioration des procédés de fabrication du zinc*), in which they point out the difficulty, or rather impossibility, of utilizing by present methods a class of ores which seems to be growing more and more common, the close and intimate mixtures of blende and galena. They review former attempts to treat zinc in the blast furnace, among them the early trials of Muller and Lencanchez, which were complete failures, and the later one by Clerc, which the authors also condemn, and then they proceed to demolish unnecessarily the patent process of Mr. Farnham Maxwell, who precipitates lead with the somewhat more expensive zinc. After some preliminary experiments, Messrs. Binon & Grandfils came to the conclusion that it would be best to use vertical retorts, set into a rectangular furnace so placed on pillars that it would be easy to get at the bottom of the distilling vessels, which are heated externally, as usual. The bottom and top arches of the furnace are pierced with round openings corresponding to the size of the retorts, which are preferably made oval in section. Cast-iron boxes form the bottom of the retorts, while the top is connected with condensing tubes which are located in niches made in the long walls of the furnace. Their thickness is increased at the back or in front by placing a back and front plate of refractory material, which leaves between them and two little vertical walls by which they are bounded a niche in which the temperature can always be so moderated as to prevent the volatilization of the zinc reduced. Messrs. Binon & Grandfils' method seems, therefore, to be a modification of the old Corinthian and English processes.

##### COMPARISON OF THE RUNNING-OUT FIRE AND HEARTH REFINING.

In the common running-out fires the pig iron is melted in contact with the fuel, and even if substances rich in oxidized iron are added to it, it is certain that the purification from phosphorus can never in this way be complete; but when it is considered that the Lancashire hearth refining eliminates phosphorus to a very inconsiderable degree, it is surprising that the common running-out process can take away so much phosphorus as it does. The reason, however, lies in the following two differences between hearth refining and the running-out process: 1. In the former the phosphorus, which has been taken up by the cinder as a salt of phosphoric acid, comes into simultaneous contact with carbon and more or less decarbonized iron, and it is a fact which is proved by several circumstances that the affinity of iron for phosphorus and many other metalloids is greater in proportion as it is purer and more refined. In the running-out fire, on the contrary, the pig iron is never decarbonized in any noteworthy degree, and it therefore never acquires so strong a disposition to reduce the phosphorus out of the cinder and again enter into combination with it. In the running-out fire, too, the fused iron in general does not come into simultaneous contact with the cinder

and carbon, but a cinder bath is interposed between the fused iron and the carbon; while, on the contrary, the iron during the operations in the refining hearth comes into simultaneous contact with the cinder and carbon, so that the phosphorus is reduced and re-enters the iron. 2. In the refining hearth the iron is subjected during the latter part of the process to a higher temperature than is the case in the running-out fire. The running-out fire process has been exceptionally carried on in a reverberatory furnace without contact with the fuel, and as the purification from phosphorus which takes place in the puddling furnace is so much more complete than that which is accomplished in the Lancashire refining hearth, it might well have been supposed that a reverberatory furnace would be distinguished in the same way in comparison with a common running-out fire. As reverberatory furnaces have been arranged, this, however, has scarcely been the case; and the reason of this is not difficult to find when it is considered that such furnaces have been lined with sand or masses of quartz, which prevent the cinder from being sufficiently basic or rich in oxidized iron; and it should never be forgotten that if any considerable elimination of phosphorus is to be brought about the cinder must always be kept so basic that the silica is well saturated, and thus has not too strong a disposition to liberate the phosphoric acid from the cinder, because if once separated it is reduced and enters into combination with the iron as phosphorus.

##### TRANSMISSION OF HEAT BY STEEL AND IRON PLATES.

In a letter addressed by Mr. John Collins to *Engineering*, that gentleman gives the following data derived from experiments made to ascertain the relative heat conductivity of iron and steel plates. The apparatus consisted of exactly similar plates of steel or iron 11/8 square, .23 in. thick, supported on glass legs, heated by a Bunsen burner consuming equal quantities of gas, maintained at 2 in. pressure constantly; and a basin 3 in. in diameter placed in the center of the plate, containing mercury in which a delicate thermometer was immersed. The temperature of the mercury was then raised from 20° C. to 160° C., and relative times noted. The average gain in time of steel over iron plates of equal thickness is 13 per cent. When the relative thickness of the plates as used in boiler building is taken, this gives an average gain of about 20 per cent. In steam boiler trials, where boilers are similar in all respects, say thickness and material, the actual gain in working 20 days of 12 hours each shows actual evaporative power of 20 per cent. in favor of steel. In another series of a similar nature by Stuckenthalz, the results gave 10.6 per cent. and 20.8 per cent. in favor of steel.

##### SIMENS-MARTIN AND BESSEMER STEEL.

Prof. R. Akerman, in his paper on the recent advances in the manufacture of iron and steel, read before the Iron and Steel Institute, makes the following statement in regard to the applicability of Siemens-Martin and Bessemer steel: The Siemens-Martin steel lends itself more readily than the Bessemer process to the production of large and heavy pieces, inasmuch as there is naturally much less difficulty in simultaneously melting in several large Siemens furnaces, for which no blast is required, than in blowing in at the same time several Bessemer converters. This is also the reason why the Compagnie des Forges et Acieries de la Marine et des Chemins de Fer, which uses Bessemer metal for its smaller cannon, makes the larger of open-hearth metal. The largest ingot which is to be found in the Exhibition was probably, from the cause just named, made by the Siemens-Martin process. For Creusot shows in its splendid and well-filled Exhibition pavilion a representation in natural size of an ingot made in this way weighing 120,000 kilograms. The largest actual ingot which is shown is also made by the same process, and is to be seen in the no less beautiful exhibit of the above-named Compagnie des Forges et Acieries de la Marine.

##### GASEOUS FUEL FOR METALLURGICAL PURPOSES.

Although in the beginning of this century the German metallurgist Lampadius recommended the use of the gaseous products of charring, and although the similarly constituted waste gases of the blast furnace were first used in 1814 by Aubertot, it was not until 1839 that Bischoff, of Magdeburg, introduced the utilization of gas as a fuel. Especially after the invention of Lundin's condenser it seemed that the conversion of fuel into gas was a good means only for the utilization of inferior grades of fuel, until the introduction of the regenerative system by Siemens assigned to gas an almost unopposed position in the production of the highest temperatures. Progress in the construction of generators or gas producers proper, and the use of their product seemed to cease, or at least became uncertain; it was limited to elaboration of details, to heating the gases and the air of combustion and to more perfect methods of their mixture. But vital points, such as the accurate measurement of the relative supply of air and gas, were either left unheeded or not realized in practice. True, Neese drew attention to the fact that the chief advantage of generator firing when compared with solid fuel was the possibility of a correct apportionment of the amounts of air to fuel, but not one constructor went beyond the adoption of the uncertain regulating action of valves, until quite recently Mr. J. Henderson proposed to supply air for the gasification and for the combustion by two distinct blowers running at speeds proportionate to the accurate amounts required. While the advantages realized by the use of gaseous fuel were conceded; while the regenerative system extended its range in all industries, calling for the economical production of high temperatures: while in puddling decided fuel economy was repeatedly established; while in the metallurgy of zinc the Boetius and other furnaces were gaining ground, and inferior fuels, such as peat, sawdust and lignite became useful even in the generation of intense flames, a widespread misconception, based solely on theoretical considerations, held undisputed sway with many metallurgists, and led them to reject the use of gaseous

fuels as wasteful. This conviction was based on the theoretical researches of Bunsen and others, that by converting carbon first into carbonic oxide and then into carbonic acid, there is a loss of heat which Kraus and Chaffaud estimate at 30 per cent. Theoretically this cannot be doubted, but when the true criterion, the actual effect in practice is considered, it will be found that gaseous fuel is more economical. The most serious objection to generator gases has been the large volume of nitrogen which they contain, and which, as it acts as a dilutant, is injurious in many respects. How seriously the presence of a large body of nitrogen is, may be inferred from the fact that according to analyses by Knapp, by Feller and others, the percentage of that element amounts to from 60 to 65 per cent. by volume, and 55 to 65 per cent. by weight of the total of the generator gas. Recently a new process has come to the notice of metallurgists, which bids fair to render to gaseous fuel for metallurgical purposes that supremacy which the convenience of its use deserves. We refer to the Strong water gas, the mode of production of which was fully given in a former issue of *The Iron Age*. Water gas, it is true, is by no means a novelty in metallurgy, as Mr. John Dawes generated it at the Oldbury Furnace, near Birmingham, by passing high-pressure steam through cast-iron retorts filled with coke and heated to bright redness. The patent office records of France, England and of this country prove that numerous similar attempts were under consideration as early as 1845 and the following years, but they all differ in many essential points from the Strong process, which has every element of success and seems destined to inaugurate quite a revolution, not alone in metallurgical, but also in domestic heating. The following analyses by Dr. G. E. Moore, giving the composition by volume of gas made at Mount Vernon, N. Y., will best elucidate the claims of the material. For comparison we add an analysis of coke gas by Knapp:

	Water gas.	Coke gas.
Oxygen	0.77	
Carbonic acid	2.05	1.3
Nitrogen	4.43	64.8
Carbonic oxide	35.88	33.8
Hydrogen	52.76	0.1
Marsh gas	4.11	...

It will be seen that approximately the nitrogen is replaced by hydrogen, and that carbonic oxide is about equal in both cases. Dr. Moore has calculated the calorific equivalent of Strong gas at 8798 units and its flame temperature at 5300° F., or above the point of dissociation of steam. These calculations, it is true, have but little value, as they are merely theoretical deductions from analyses; thorough practical calorific trials must be made in order to obtain data which will satisfy the iron master or manufacturer.

##### RECENT EXPERIMENTS WITH THE DU PUY PROCESS.

Since the experiments made at Reading with the Du Puy direct process, of which we gave a description in the issue of *The Iron Age* of Oct. 3, and by which it was shown that anthracite slack is sufficiently good material for deoxidation, some further trials have been made at the Sligo Iron Works at Pittsburgh, for the purpose of testing this process further, by throwing the lumps of metal into a Burden squeezer, and then rolling them to "muck bar" at the same heat. Hitherto they had usually been forged to blooms under a hammer and afterward reheated, to be drawn to bars. The furnace was operated experimentally with 32 heats. There was found no difficulty in making balls to pass through the squeezer and muck rolls at the same heat, just as ordinary puddle balls from pig iron is squeezed and rolled at the same heat to muck bar, but in order to fill the squeezer, which required balls of 150 or 200 pounds to secure a good compression, it became necessary to weld and press several of the lumps of metal together in the furnace at a heat so high as to cause the alkali to drip more or less from the mass and soften the sand bottom. As the balls were thus compressed and rolled in the fused sand, an unnecessarily large portion of the iron was thereby cut by the sand and wasted to a silicate of iron, so that the yield from Republic ore, which before the bottom became softened produced 53 pounds of iron in muck bar from 100 pounds of ore charged, and





quotas demanded. The result is of course very uncertain, and the trade is in a greatly demoralized condition in consequence. Prices are confessedly "nowhere," and no regular quotations are given; in fact, no attempt whatever is made to make uniform prices, each one making such prices as it seems possible to obtain. Buyers are very scarce, and there is a good deal of Coal being "peddled" to find a purchaser. We hear of some cargoes offered at very low figures, and in one or two cases purchases were made. In general, however, consumers are shy, and prefer to wait and see whether a new combination is to be formed. If a general war ensues, prices, of course, will be slaughtered, and Coal purchased at present figures, although very low, will hardly be considered a good bargain. Retail dealers here in the city are running with as light stocks as they can safely carry and fill their orders from day to day. Even the retail trade has stopped, and the carts have very little work or are entirely idle. In the face of all this the month's quota is increased by a million tons. Coal is consequently coming down freely, and stocks have already begun to accumulate at the shipping points. The present uncertain condition of trade must continue until some understanding has been reached in regard to the combination. In some circles the remark has been made that no permanent change can come to the trade until they fight the battle out and send the weak ones to the wall, and bring about a pretty general bankruptcy. Be this as it may, it is very difficult to see how the great carrying and mining companies can escape from a very serious fight for existence.

#### PHILADELPHIA.

Office of *The Iron Age*, 220 South Fourth St., PHILADELPHIA, Dec. 10, 1878.

**Pig Iron.**—There has been a fair amount of business transacted considering the season, and the market holds steady and firm. At this late season a falling off in the demand is usually looked for, but up to date business continues active, with continued evidences of a desire to purchase somewhat in excess of the offerings. This refers to standard brands only; inferior and doubtful lots are not sought for, and can only find purchasers at low and uncertain figures. Brands of established character appear to have reached a point at which there is no difficulty in making sales, and unless the supply is increased or the demand slackens some little advance in prices is not at all unlikely. The near approach of the holidays, however, will doubtless check the demand, and if stocks begin to accumulate buyers will be in a position to supply their wants at prices now ruling. This, in fact, is the opinion of the most experienced men in the trade, viz., that the tone of the market at present is very firm, but that the dullness usual at this season may result in some accumulation of stock at the furnaces, and thus for the time being prevent any change in prices. There is more confidence in values, however, than we have seen at any time within the past three years, and the feeling among all classes is that at present figures for good Iron there is no danger in carrying stock. There is a degree of caution, however, which prevents extensive speculative purchases. Buyers are not so eager to anticipate their wants to any great extent unless they obtain concessions for so doing, while sellers are equally indifferent unless they can obtain current rates. Business is therefore largely confined to immediate deliveries, the future being left in a measure to the developments of the new year. It is satisfactory to note, however, that there are no fears of any break in the market, and this feeling of confidence will do much to remove the depression which has so long pervaded the entire business of the country. We quote as before, with the larger portion of the business at medium rates. Prompt cash occasionally enables buyers to place their orders at inside quotations, but such transactions are exceptional. We quote: Select No. 1 Foundry, \$17.75 @ \$18.50; ordinary Lehigh brands, \$17 @ \$17.50; No. 2, \$16; Gray Forge, \$15 @ \$16; White and Mottled, \$14.50.

**Blooms.**—Continue dull, and it is difficult to sell large lots. Prices are nominally unchanged, viz.: Blooms (246 lb.), \$38 @ \$39; Northern Ore Blooms (220 lb.), \$33 @ \$37; best quality Charcoal Billets (2240 lb.) for wire and steel purposes, \$58 @ \$60; Bars do., \$62.50 @ \$65; Sheet Iron Blooms, cornered (246 lb.), \$53 @ \$55; Cold-blast Charcoal Plate Blooms, \$50 @ \$53; run-out Anthracite, \$45 @ \$47.50.

**Muck Bar.**—There are buyers at \$28 @ \$29, but holders ask \$30 and upward, so that there is very little business doing. Small lots of extra quality command about \$32.

**Structural Iron.**—A fair business has been transacted during the week past. No large amounts have been called for, but the demand for small lots has been quite active, and for the season a satisfactory business is reported. Prices are a little weak, however, and although we make no change in quotations, desirable orders continue to be accepted at concessions of one to two-tenths from asking rates, which are about as follows: Angles, 2.2¢ @ 2.4¢; Tees, 2.4¢ @ 2.5¢; Beams and Channels, 2.7¢ @ 2.8¢.

**Plate and Tank Iron.**—There is not much change in the general condition of the market, and with one or two exceptions the mills are rather bare of orders and report but few inquiries, with some weakness in prices. At this season no immediate improvement can be expected, but with the cheerful outlook in other directions it is not likely that the depression in this department will be very protracted. In the meantime we quote the market dull and prices weak, as follows: Common Plates, 2.2¢ @ 2.3¢; Tank Iron, 2.3¢ @ 2.5¢; C. No. 1, 2.4¢ @ 2.6¢; Shell Iron, 2.75¢ @ 2.9¢; Flange Iron, 3.7¢ @ 4¢; Solid Firebox, 4.85¢ @ 5¢, and Best Bloom, 5.5¢ @ 6¢.

**Sheet Iron.**—The demand has dropped off somewhat suddenly, and but few orders have been entered since date of our last report. Business is now rather of a retail character, small lots to make up an assortment and parcels for immediate use. The season is evidently drawing to a close, and although a large amount of stock has been

marketed the result of the year's business is not likely to turn out satisfactorily. Prices have been steadily declining, and it is doubtful if manufacturers will come out whole. No change in prices is expected until after the first of the year, when there may be some readjustment, according as balance sheets may indicate. We quote: Common Sheet, No. 20 to 23, 2.8¢ @ 2.9¢; No. 24 to 26, 2.0¢ @ 3¢; No. 27 to 28, 3.1¢ @ 3.15¢; Best Refined Sheet, No. 25 to 28, 3.2¢ @ 3.3¢; No. 22 to 24, 3.1¢ @ 3.2¢; No. 16 to 21, 3¢ @ 3.1¢; Best Bloom Sheets, No. 25 to 28, 5.1¢ @ 5.2¢; No. 22 to 24, 5¢; No. 16 to 21, 4.7¢ @ 4.8¢; Refined Plates or Blue Annealed, 5-16 to 16, 2.3¢ @ 2.4¢; American, R. G., 5-16 to 16, 2.9¢ @ 3¢; Best Bloom, 5-16 to 16, 4.8¢ @ 4.9¢; A Patent Planished, 10¢; B Patent Planished, 9¢; Best Bloom Galvanized, 45¢ discount; second quality, 55¢; extra discounts for large lots.

**Bar Iron.**—There is no change to note in the Bar trade, and prices are still somewhat unsettled and irregular. Several leading mills are full of work, for which it is claimed full prices have been obtained, but others find it difficult to secure orders unless at concessions from quoted rates. It is difficult to reconcile the statements made by leading manufacturers on any ground except that each will make its own classification, and that those getting the most business make the greatest allowance on extras. The base price for Best Refined Iron is supposed to be 1.9¢, and all claim to be firm at that figure, although buyers report that they can place orders for extras at prices equal to 1.6¢ @ 1.7¢ as base on the old list. This feature of the market is very discouraging. There is a moderate amount of business doing, a fair inquiry for additional lots and a satisfactory outlook generally, but with no fixed basis of values. There is a degree of uncertainty which is rather disquieting. We regret that such a report has to be made, but the facts are too important and too well known to be ignored. When the trade is on a better footing we shall so report it. Meantime prices are nominally as before, viz.: Common Iron, 1.5¢ @ 1.6¢; Medium, 1.7¢ @ 1.85¢; Best Refined, 1.9¢ @ 2¢.

**Steel Rails.**—There is not much new business to report as definitely closed, but a large amount is well under way and likely to be closed in course of a few days. Buyers are doing their utmost to get prices down; many leading companies having bought last year at about \$40 are unwilling to give in their orders at about \$2 advance, which is usually demanded. Small Lots have been placed at \$44 at tide, and a large amount of business could be closed immediately at prices equivalent to a reduction of \$1 to \$2. Sellers are firm, however, and at the moment, there is not much probability of lower prices, although as stated, the leading buyers are reluctant to pay any advance on prices current at this time last year. The market is firm at \$41 to \$43 at mills, according to location, the lower figure being for large lots and deliveries favorable to the seller.

**Steel Blooms.**—Slabs are quoted at \$42 @ \$46, and Billets at \$48 @ \$50.

**Iron Rails.**—The demand is well maintained and several fair-sized orders have been placed during the past week; one lot of 800 tons 25 pound section is reported, and numerous small lots, chiefly of light Rails; also a 2000 ton lot rerolled for export. Prices are steady, and with a considerable amount of work on hand at the mills the market may be considered firm at former quotations, viz., \$32.50 @ \$35, according to quality, section, and location of mill.

**Old Rails.**—The market is still bare of stock, and anything of a reasonably fair quality has sold ready at \$19.50 @ \$20. We do not hear of any lots offering for spot delivery, but there are buyers at the above figures, and higher for extra qualities. A lot of 2500 tons was sold a day or two ago at \$19.50 at a point near the city, and for spot lots \$20 is obtained in a small way. We quote the market steady at \$19.50 @ \$20 for average qualities.

**Spikes.**—The demand continues good and prices steady as follows: 5 1/2 x 9-16, 2¢; 3/4 x 4 and longer, 2.3¢; 7-16 x 4 and longer, 2.4¢; 3/4 x 3 1/2 and longer, 2.7¢; 3/4 x 3 and longer, 2.8¢.

**Serap Iron.**—The market is fairly active, and selected qualities command outside figures, viz.: Cast, \$14 @ \$15; Wrought, \$20 @ \$22.50.

#### PITTSBURGH.

Office of *The Iron Age*, 77 Fourth Avenue, PITTSBURGH, PA., Dec. 10, 1878.

The inclement weather has had a tendency to curtail general business, which at best is always light this month; nearly all our manufacturers report that orders have fallen off considerably within the past week or two, and while some of them still have about all they can do, having been sold ahead of their production, others have found it necessary to curtail their production for want of orders, being anxious to close the year with as little stock on hand as possible. However, while there is a lull at present, it was not unexpected, and the outlook is regarded favorable for a good spring trade, which usually opens up about the middle of January. Stocks of manufactured goods, both in first and second hands, are comparatively light, and the production is likely to be light for some time to come, as a large percentage of capacity, it is probable, will continue unemployed, having passed into the hands of creditors, who, owing to the very small margin for profit, will be in no hurry about starting up again; and, moreover, as times get better there will be an increased consumption.

The most serious drawback to our manufacturers apparent at present is that of increased taxation, which is highly probable in view of the recent decision of the Supreme Court, that the city must make provision for meeting both the interest and principal of her street bonds. While the decision is generally regarded as a righteous one, as the bonds never could have been negotiated had not the city guaranteed their payment, it is a hard blow on the taxpayers, and it is feared, by increasing the already burdensome taxes, will have a bad influence on the general welfare of the city. Real estate, owing to the heavy taxation, is almost worthless; holders generally want to

sell at a sacrifice, and even then it is hard to find buyers, as there is very little inducement to put money into property, even if it can be bought for one-half what it would have brought a few years ago. Many of our manufacturers who are large owners of property would, we have no doubt, be satisfied if they could make clear what they have paid out for taxes. However, there is some consolation in knowing that Pittsburgh is not singly and alone in this respect; nearly all the large cities are in just as bad, if not worse, condition, and there is no question but this is a serious hindrance to a return of prosperity.

The most important event of the week was the meeting of the Western Nail Association, the first for a long time, and a much better feeling prevails in consequence. Arrangements are being made for a meeting of the Western Iron Association in a few days, which it is hoped will be productive of good.

**Pig Iron.**—There has been no particular change in the situation since our last report; business continues quiet, as it always is this month, while prices remain unchanged.

One of our commission merchants, however, reports having had offers on several round lots, but the figures offered were unsatisfactory to the furnaces. This indicates a healthy market, showing that producers, notwithstanding the present lull, are refusing to make concessions in order to effect sales; also, that some buyers at a slight reduction from current rates would not object to anticipating future wants. It is well known, and very generally conceded by those who are familiar with the business, that even those furnaces favorably located, having all the latest and most important improvements and under the best of management, cannot more than hold their own at prices now current, and moreover, the cost of production has been reduced down to the lowest notch and is more likely to be increased than reduced. Indeed coke, which is a very important factor in the production of Pig Iron, has gone up 10¢ @ 15¢ per ton within the past few weeks; the cost of mining coal has been recently advanced half a cent per bushel, and it is pretty evident that labor is down to the bottom; this being the case, we can see no reason why the value of Pig should depreciate, nor, on the other hand, is there any reasonable probability of an early advance of any consequence. Bituminous Coal Smelted Irons still quoted at \$19 @ \$20, 4 mos., for Foundry, and \$17.50 @ \$19.50, 4 mos., for mill, the outside figure for all-ore Red Short; Coke Irons, \$16, cash, to \$16.50 for mill. Charcoal Iron very dull, scarcely enough doing to establish prices. Bessemer Pig continues quiet and unchanged at \$20, 4 mos., for No. 1. There is said to have sprung up quite a demand for No. 3 Bessemer recently for special purposes, and it is selling more readily than No. 1. Charcoal Blooms quoted at \$55 @ \$60.

**Manufactured Iron.**—Orders continue to fall off, as they usually do this month, and some of the mills within the past week have changed from double to single turn; however, business is fair for the season, and the outlook for the spring trade continues promising. The indications are that the consumption of finished Irons will be considerably larger in 1879, as compared with 1878, and it strikes us that the first change in prices will be upward, as, like the raw article, there is a very small, if any, profit at the prices now ruling. Another important matter lies in the fact that the production is comparatively light, a number of mills in the West still being in hock, with but little prospect of being started up soon. Prices are still quoted upon a basis of \$1.75, 60 days, for Merchant Bars.

**Nails.**—The meeting of the Western Association, which took place here last week, was largely attended, all the 26 mills belonging to it being represented, with one or two exceptions; notably among the absentees were the Belfont mill at Ironton and the Norton Works at Ashland, Ky. The session, while most important one, was characterized by great harmony, and was protracted until 10 o'clock Wednesday night. The price agreed upon, \$2.15, 60 days, 2¢ off for cash, and a reduction of 10 cents per keg on lots of 200 keg lots and upward, was satisfactory, and while it is an advance, the margin for profit is still small. It was also agreed to fix the price at Chicago and St. Louis, the two great points of distribution in the West, at \$2.25, 2¢ off for cash. The project of "pooling" was discussed at considerable length, but no definite action was taken. It is proposed to establish agencies at Cincinnati, Chicago, St. Louis and Cleveland, through which all Nails are to be sold on a cash basis, and all traveling salesmen are to be cut off. However, each mill is to remain under control of its present management, and in this important respect it will differ from other pools. The project, which appears to meet with considerable favor, will be passed upon at the next regular meeting of the Association, which takes place on the 18th instant in this city.

**Rails.**—The market for Steel Rails is still quoted steady at \$44, cash, delivered free on cars in Pittsburgh. New Iron Rails are also firm, with a tendency to higher prices. Old Iron Rails continue in light supply, and with considerable inquiry are firm, although we have heard of no sales having been made above \$23, and buyers do not appear willing to go above that figure, although it is said they cannot be laid down here from any of the sources of supply under \$23 @ \$24.

**Steel.**—The demand is not active, nor is it to be expected at the close of the year; prices easy, but without quotable change. Machinery Steel, 4 1/2¢ @ 7¢; Tool do., 10 1/2¢ @ 12 1/2¢; Tire Steel, 3 1/2¢ @ 6¢; Boiler Plate, 6 1/2¢ @ 7 1/2¢; Piv Steel, 3 1/2¢ @ 7¢; Spring Steel, 3 1/2¢ @ 6 1/2¢; Steel Blooms, \$41.50 @ \$42; do. Billets, \$43.50 @ \$45; do. Bloom Ends, \$30 @ \$32; do. Rail Ends, \$30.

**Wrought Iron Pipe.**—The demand for all kinds of Wrought Iron Pipe is light, as it usually is this month, and there is not likely to be any improvement until the spring trade opens up. Discounts on butt-weld still quoted at 60 @ 65, with rumors of 70 being in some cases allowed. Boiler Tubes, 40¢; Oil-well Casing and Tubing, net cash.

**Serap.**—The movement in all kinds of Scrap is light, although fair for the season; no recent change in prices. No. 1 Railroad Wrought Scrap, net, \$21; Boiler Scrap, \$22; Old Car Wheels, gross, \$18 @ \$19; Wrought Turnings, net, \$14 @ 15; Cast Borings, gross, \$10 @ \$11; Car Springs, net, \$31; Car Axles, \$27 @ \$28; Blacksmith Scrap, \$20.

**Coke.**—There is no apparent falling off in the demand; manufacturers are all well supplied with orders, some of them are sold considerably ahead, and prices continue firm, with an upward tendency. We continue to quote at \$1.05 @ \$1.15 per ton, free on cars at ovens. Shipments continue to be made in all directions, both by river and rail, and we do not think there is any risk on the part of buyers in making contracts at current rates, as we are well satisfied that prices are more likely to advance than decline. A number of Eastern furnace companies are now using Coke in connection with Anthracite Coal, and with, we understand, the most satisfactory results.

**Coal.**—The Coal trade continues quite active, and with a continued good stage of water liberal shipments are being made West and South by river. There is also considerable inquiry from points in the interior, and the railroads have a demand for about all the cars they can furnish. Prices continue firm, but unchanged.

**Wind Glass.**—The demand has fallen off considerably within the past week or two, as it usually does at this particular time, and business is likely to drag until the spring trade opens up, which cannot be looked for until about the 1st of February. Trade has been unusually active this fall, but prices were unremunerative. Discounts may be quoted at 75 @ 75 and 5.

#### CHATTANOOGA.

Office of *The Iron Age*, Market and 8th Sts., CHATTANOOGA, Dec. 7, 1878.

**Pig Iron.**—There is a steady and healthy growth in general business in this district. Newspapers are generally regarded as excellent business barometers, and our papers generally are better patronized by advertisers this season than I have observed them to be at any time during the last five years. Merchants are hopeful and are pushing business. In the general Iron trade there is a better feeling than has been experienced since 1872. Not that prices have materially advanced, but because present rates are very stiffly maintained, and of the general conviction that bottom has been touched, and that resumption and other forces will gradually build up trade on solid and reliable foundations. The general Eastern and Northern tone has helped to inspire confidence here. The hopeless bankruptcy of antiquated furnaces and mills, and the ruin of their legions of successive adventurous operators has about reduced the Iron-making business in this region to legitimate capital in skilled hands, which operate fewer plants, but will finally produce a larger volume and better articles.

**Pig Iron.**—The recent advance in Forge Irons has been maintained. Sales are only fair. Holders are crowding the market. Orders are only to fill present demands of consumers, a state of trade likely to continue until after the holidays. We quote: Coke Irons, No. 1 Foundry, \$17.50 @ \$18; No. 2, \$15.50 @ \$16; Gray Forge, \$13.50 @ \$14; White and Mottled, \$11.50 @ \$12. Hot Blast Charcoal—No. 1 Foundry, extra, \$20 @ \$21; ditto, \$18 @ \$20; No. 2 Foundry, \$16 @ \$18; Gray Forge, \$15 @ \$17; White and Mottled, \$15. Cold Blast Charcoal—Car Wheel Metal \$22.50 @ \$27.50; do., Extra Standard, \$24 @ \$20.50; Forge, \$17 @ \$22.

**Muck Bar.**—\$27 @ \$34. Old Rails, \$18 @ \$18.50. Old Car-wheels, \$18.

**Ores.**—Brown Hematite, 50 to 55%; per ton, \$1.75 @ \$2.25. Red Fossiliferous, 50 to 55%; per ton, \$1.70 @ \$1.90. The above prices for ores delivered in Chattanooga on cars or on the wharf from flat boats.

**Nails.**—There is nothing new to note here. Makers hope the action of the Western Association advancing Nails at Pittsburgh, and upper Ohio mills generally, from \$1.95 @ \$2 to \$2.15 rates at the mills will have a good effect here, and enable our mills to realize a reasonable profit. We also learn that the Association fixed the price at Chicago and St. Louis at \$2.25. If this action "sticks" it will serve to restore the Nail business to something like a fair and healthy condition.

**Manufactured Iron.**—Business continues to be good, with signs of an advance in rates on some articles. The mills are running to their full capacity, and have orders enough in hand to insure them a fair winter's work, if there should be a considerable slackening in the demand—an event not likely to happen. Railroad supplies are rather better than usual at this season of the year, in part due to the fact that re-pairs were almost all wholly suspended on our roads during September and October. Bar we quote at \$1; Railroad Spikes, \$2.50; Light Rail, \$2.25; Track Bolts, \$3; Trestle Bolts, \$4.

**Coke.**—We have now in market a supply of washed foundry coke of excellent quality, which we quote at 13¢ to 15¢ per bushel, free on cars in Chattanooga. Furnace Coke we quote at \$2.50 per ton and in good supply. One manufacturer has offered to make contracts in large amounts at \$2 per ton.

**Coal.**—This important article is in good supply and prices rather tend downward, on account of the sharp competition of producers and dealers. Most desirable qualities for domestic use are delivered at 12 1/2¢ @ 14¢ per bushel. Run of



## INDUSTRIAL ITEMS.

## MAINE.

About 700 tons of ore has been hauled to the furnace of the Katahdin Iron Works, in Piscataquis county, and blowing has been resumed. This ore is regarded as the best that has been taken out.

## MASSACHUSETTS.

The Fitchburg Railroad Co. have adopted the Ashton noiseless safety valves, and are applying them to all their engines.

A corundum wheel, manufactured by F. B. Norton, of Worcester, which the Hood Company used in grinding grooves on pistol work in their establishment at Norwich, Conn., ground 300 grooves and was then sent back to Mr. Norton as a curiosity. It was  $1\frac{1}{2}$  inches in diameter at the outset, and is fully  $1\frac{1}{2}$  inches in diameter now.

## NEW YORK.

The Buffalo Courier says: We are informed that a very extensive English manufacturing company is investigating Buffalo as a location for a branch establishment. This company propose to meet American competition by manufacturing here, and we trust that this city will be the locality selected.

H. R. Worthington is building the second compound duplex pump for the Albany and Rensselaer Iron and Steel Works; also the sixth duplex pump for the United Pipe Line of Bradford, Pa.

Five of Corcoran's largest windmills were shipped last week—three for Havana on the steamer City of Washington; one for Matanzas, and another for Cardenas. They are to raise water for plantation purposes. The largest, 24 feet in diameter, with a tower 50 feet high, is designed for a well 222 feet in depth.

## NEW JERSEY.

The sale of the extensive foundry and iron works of Jesse W. Starr & Son, at Camden, which had been fixed to come off recently, has been indefinitely postponed, an injunction having been served on the late Sheriff Daubman, restraining further proceedings. An impression prevails that the business affairs of the concern will soon be adjusted in such a way as to avoid a sale altogether.

## PENNSYLVANIA.

The new iron steamship State of California, built for the Pacific Coast Steamship Company, was successfully launched at high water on Dec. 5, from the shipyard of the Messrs. Cramps, at Kensington. The California, which is built under the rules of the British Lloyd's, is 320 feet long, 37 feet beam and 26 feet depth of hold.

The Glendower Iron Works at Danville are engaged in making rails for export to Cuba.

The Stewart Iron Company's furnace at Sharon made another big run of iron during the month of November, having produced 1400 tons of Bessemer iron, a daily average of more than 50 tons.

The report that the Baldwin Locomotive Works were about to remove from Philadelphia is emphatically denied by Mr. John H. Converse, an official of that company.

The Allentown Iron Company lays its failure to the anthracite coal combination's high prices for fuel; but the combination people say it was the low price of iron did it.

The stockholders of the Co-operative Iron and Steel Works, Danville, met on Monday last week and elected the following board of directors: Peter Baldy, Jr., L. K. Rishel, W. R. Williams, A. J. Ammerman, Daniel D. Long, E. W. Conkling, Perry Deen, John H. Grove, J. C. Rhodes, Jacob Sechler, Sr., and Egbert Thompson.

We take the following from the Sharon Herald of the 6th inst.: At the New Mill every wheel in the building is in motion the present week. On last Monday the men held another meeting, at which it was determined to resume work; so on Tuesday morning the puddle mill went on double turn. On Wednesday morning the guide mill went on double turn and the nail plate mill ran the two last days of the week, so as to have stock for the nail factory to begin with on Monday, and now—Monday of the present week—everything is in motion (the greater portion double turn) and likely to stay in motion all winter. The blast will be put on Keel Ridge Furnace by Thursday or Friday. Sheet, guide and hoop mills double turn; bar mill single turn; nail factory and plate mill off; both railroad spike machines on; chain factory, all its fires on. Blast Furnace No. 2 still keeping up the old tune of first-rate-and-a-half. Stewart Furnace No. 1 still doing well, as last reported. At West Middlesex, Mr. Owens got his gas furnace in operation on Friday. It appears to give satisfaction. No talk—not even a rumor—of any of the Shenango furnaces going in.

## PITTSBURGH AND VICINITY.

A new wrought-iron bridge will be constructed over the Allegheny River at Franklin, next spring. The Morse Bridge Company of Youngstown, Ohio, have the contract.

Totten & Co. of Pittsburgh report that they have received their third order for nail machines from England.

Messrs. Wilson & Bailey, the well-known pig iron dealers of Pittsburgh, have removed their office to No. 88 Fourth avenue, over the Tradesmen's National Bank.

About two weeks ago a number of furniture makers decided to organize a co-operative company and run a factory of their own. The project took well. Last week another meeting was held, a constitution and by-laws adopted and officers elected. Shares are placed at \$100 each, and no one is allowed to take over \$1000, unless it be as reserve shares, which will draw no dividends. Already \$25,000 worth have been subscribed for, and there is every prospect that the project will be a complete success. It is proposed to purchase a factory that is already in operation, either in Pittsburgh or Allegheny. Arrangements are now being made for procuring machinery from the East, and it is expected that the factory will be in operation by New Year's.

## MARYLAND.

Irvin & Co., of Baltimore, agents for the anchor nail, &c., report about 60 tons of nails behind their orders and about 80 tons in guide irons.

Messrs. Troxell, Handy & Greer, Baltimore, report a good trade, and many orders for future delivery.

## WEST VIRGINIA.

Messrs. Joseph Bell & Co., of Wheeling, have added quite an improvement to their well-known cooking stoves, in the shape of a fender or bench attached to the oven door where victuals can be kept warm.

## OHIO.

Messrs. H. L. Shepherd & Co., of Cincinnati, manufacturers of the Shepherd lathe, have taken the large foundry and machine shops formerly occupied by Warneford, Foley & Co., at Nos. 331 to 337 West Front street, and are putting in new boilers and extra shafting. The floor of this foundry is 100 by 167 feet, and the machine shops and ware room are large. They removed from their old works, on Elm street, on a Saturday night, after having run down a heat, and on Monday following they were ready to run a heat at the new place. This was a feat worthy of notice from the fact that they had a considerable amount of machinery, including engine and boilers, to remove. Their works are now running full, with large orders awaiting fulfillment, some of which are from Russia, England, Norway and New Zealand. They will largely increase their force of hands next year.

It is stated in the Cleveland Trade Review that the Cleveland Rolling Mills Company are now putting up a new wire-rolling machine—a German invention—by means of which at least one-third of the labor ordinarily required for such work is saved. For some reason the matter is kept as secret as possible, no one being allowed about the machine except the workmen engaged upon it and one foreman.

A portion of the Etna Mill, at Newburg, is now in operation making soft steel barrel hoops. From 25 to 30 men are employed, and from 12 to 15 tons of hoops turned out daily.

John L. Gill, of Columbus, is building cars for the following narrow-gauge roads: Georgetown, of Texas; College Hill, Cincinnati; Toledo, Delphos and Indianapolis; Delphos, Bluffton and Frankfort. He is also making 100 car wheels a day, and reports the outlook as good.

The new open-hearth Siemens steel furnace at the Burgess Steel Works, at Portsmouth, commenced operations Monday, the 2d inst.

Himrod Furnace No. 2, Youngstown, turned out last month, ending with Saturday, 1937 tons, mostly foundry iron. This is the biggest yield ever made by this or any other furnace in the valley.

The new Enterprise Mill, at Youngstown, has been idle in all its departments since Thursday noon of last week. The old mill is in full blast.

## ILLINOIS.

Mr. L. H. Watson, machinist, of Chicago, exhibited at the Chicago Exposition this fall a very handsome portable upright engine 16-horse power, with automatic cut-off, having no belts. This engine attracted considerable notice. Mr. Watson is now running his works with a full complement of hands working at the rate of 14 hours per day upon engines and other machinery.

The Joliet Iron and Steel Works have melted 18,822,125 pounds of metal during the past month.

At a recent meeting of the stockholders of the Centralia Iron and Nail Works the capital stock of the company was increased from \$34,000 to \$60,000: 250 shares of stock voted and not one against the proposition. It is expected that the company will begin the manufacture of nails some time in January.

The Union Rolling Mills and the North Chicago Rolling Mills are now running in full blast. The latter establishment during the last few weeks has taken on over 400 additional hands, and is employing upward of 700 men. The Union Company have also largely increased their force. Both are turning out daily thousands of tons of railroad iron. The Bay View Works at Milwaukee, which have been consolidated with the North Chicago Company, are to be put into full blast.

## INDIANA.

The Hagan Car Works at Terre Haute have built 1500 freight cars this year.

## KENTUCKY.

There is no probability whatsoever that the Norton Iron Works at Ashland will resume general operations before half a year. They have now 3800 tons of pig metal on hand, which will furnish their nail mill a four months' job, and as this department will likely not be started before next spring it will not be necessary to start their furnace before the middle of next summer. In the meantime their numerous employees have a somewhat gloomy outlook for the immediate future.—Greenup Independent.

Mount Savage Furnace has commenced chopping for another blast.

The Ashland Furnace is working well, making a good quality of foundry iron and about 40 tons every 24 hours.

Nearly 12,000 cords of wood will be chopped and charred for Hunnewell Furnace the coming winter and summer.

Charlotte Furnace, which will not blow out before the 10th of January, has decided to make another blast and has commenced cutting wood to manufacture 2500 tons of pig iron next year.

Hunnewell, Pennsylvania and Mt. Savage will blow out this week.

The property of the Boone Furnace passed into the hands of the new receiver, John G. Peebles, of Portsmouth, a few days ago. The property has been involved in law for several years.

An item is "going the rounds" to the effect that the first blast furnace in Allegheny county, Pa., was built in 1859. According to Mr. Swank's "Iron Making in Pennsylvania," the first furnace was built at Shady Side, probably in 1792, and abandoned in 1794. The metal produced was used in casting stoves, grates and hollow-ware. The ruins of the furnace were visible as late as 1850. The first furnace now standing and in operation in Allegheny county, the Clinton, was built in 1859, and this is probably what is meant in the item quoted.

## Drawbacks on Damaged Imports.

The Secretary of the Treasury has issued the following circular to Customs officers, explaining certain instructions in reference to the examination of imported merchandise on which allowance is claimed for damage occurring on the voyage. The circular says:

Article 511 of the regulations and decision 3636 of July 6, 1878, require the actual opening and examination of each and every package of merchandise on which allowance is claimed for damage occurring on the voyage of importation before any abatement of duties on account of such damage can be granted. These instructions were intended as a general rule for the guidance of Customs officers, and were designed to protect the revenue from allowances for merely speculative damage. The experience of the Customs officers at many of the principal ports has shown that an enforcement of the order of July 6, as to some classes of goods, is not actually necessary to enable them to obtain knowledge of the extent of the damage which the merchandise embraced in the importation has sustained on the voyage, while a strict enforcement of the order increases the damage to the goods and causes great delay and expense to the parties interested. The following classes of goods are therefore excepted from the order mentioned: Green and dried fruits in packages; sardines, pickles, and other articles in sealed packages; pepper, pimento, and mace; macaroni; soda-ash and caustic soda; sugar in mats or bags; rice in bags. Of green fruit, not less than 10 per cent. of the packages, of each mark on the invoice, shall be opened and examined. Of sardines, pickles, sauces and other like articles in sealed bottles, jars, or cans, not less than 10 per cent. of the outer packages shall be opened and examined, but the number of bottles, jars, &c., which shall be opened is left to the discretion of the appraiser. Of the other articles mentioned, not less than 10 per cent. of the packages shall be opened, but the examination of a greater number is left to the judgment of the appraiser. In no case, however, will the selection of the packages to be opened be made by any other person than the officers of the appraiser's department. Sugar in packages, and pepper in bags, may be examined by taking proper samples from the packages by means of tongs, where such mode of examination is practicable.

## Reciprocal Free Trade.

The London Mining Journal publishes the following significant article:

When the free-trade policy which has well ruined the commercial interests of this country had been but very partially adopted, it was strenuously urged by the Conservatives, and notably by Mr. Benjamin Disraeli, that, although there was nothing objectionable in free trade in the abstract, it would inevitably ruin our home trade unless we had a care that in opening a market in Great Britain for the foreign producer we at the same time secured a market in the country to which such foreign producer belonged, for an equivalent amount of something which we produced ourselves; it was Mr. Disraeli who declared that free trade with reciprocity was the only principle that ought to be accepted by the British nation. The accuracy of this view was ignored at the time by the Liberal party in general, and by the Manchester school of political economists in particular, but now that a quarter of a century has passed and England has had experience of the working of the Manchester system, the absurdity of unrestricted free trade has become too evident, and the utmost care will now be necessary to prevent a return to that antiquated system of protection which would be altogether incompatible with present progress, or, what would be infinitely worse than the protective system of half a century ago, the adoption of the principle of retaliatory export duties which have the indisputable objection of shutting up home trade with foreign markets in order to counteract the legislation of a single competing country.

It has already been pointed out in the Mining Journal that British iron manufacturers have themselves closed more than one foreign market by their disreputable principle of sacrificing both quality and utility in order successfully to compete with regard to price; and what has been said of iron manufacturers applies with equal force to the manufacturers not only of steel and other metallurgical products, but to every branch of industry, and as a consequence Great Britain has lost her reputation for quality and solidity, while, as a result of the Liberal free trade policy which has given to foreigners not only our best machinery, but also our best machine tools, those whom free trade temporarily secured as customers for British producers are now able to produce for themselves at a price which excludes us altogether.

The necessity of reciprocity is now most severely felt, and it is very generally considered that the present system must be changed. Referring to the subject, Mr. Peter Watson remarks with regard to the mining interests, that already there is a long way to go in the direction of legislative protection for our home produce and industries, and no wonder, he continues, "when we see the counties of Cornwall and Devonshire, the two richest mineral counties, almost annihilated by the stoppage of nearly all the copper, tin and lead mines. The highest price of copper a few years ago was at £150 to £170 per ton, but through the large importation of foreign copper has gradually fallen to £55 to £60 per ton. Tin, which was once at £150 to £155 per ton, has in like manner fallen to £55 to £60 per ton. Lead also from £25 to £15 per ton. Iron of various descriptions, and manufactured iron goods, are now sent into this country cheaper than we can make them."

America and other nations have made, and are still making, such rapid progress that if free trade is to continue we must have some reciprocity treaty carried out if the produce and trade of this country is to again become remunerative. Why, for instance, should we ship lead to New York, and on landing it there to be charged a duty of £4 per ton, while on the other hand the Americans and other nations deliver their lead here free! What are our Cornish representatives and others

in Parliament doing who ought to be looking after the mineral producers' interests of this country being protected from free importation by insisting on strict and just improved treaties being carried out? Let the minister in future be corrected, and call the modern commercial policy free importation and not free trade. Now, reciprocity, if practicable, would no doubt to a considerable extent remove the difficulties of which so many are at present complaining, but to secure a reciprocity treaty involves—and it is useless to shut our eyes to the fact—inducing other nations to think as we do, which is often a long and difficult process, while the establishing of a protective duty enables the nation levying it to secure its object at its own discretion. As compared with export duties, protective duties have unquestionable advantages, since they enable us to give the importer the power to supply us cheaply with precisely those articles which we most want.

The question of protective tariffs has been

very fairly discussed by Mr. David MacIver in a communication to the Times, in which he remarks that the most ardent free-trading theorist would, he supposes, admit that the protective tariffs of foreign nations, and in some of our own colonies, are injurious to the manufacturing interests of Great Britain. But he is prepared to go much further than this, because he entirely believes that those protective tariffs, if continued long enough, are not merely injurious to our home industries, but will come to mean the absolute extinction—so far as manufacturers are concerned—of our export trade. Nor does he think that foreign nations or the colonies are at all likely, of their own accord, to modify those tariffs to our advantage, because he believes that protectionist nations are not such fools as our British political economist would have us believe them to be. It seems to him that these foreign and colonial gentlemen for the most part understand their own interests perfectly, and that we may reason with them until doomsday without any result so far as the advancement of free-trade principles is concerned. Mr. MacIver very fairly points out that those countries will adopt or reject free trade as it suits them, and that they are perfectly able to judge for themselves in the matter without any assistance from us. Anything more puerile than the memorial of the British Iron Trade Association to the Belgian government can scarcely be imagined, and it must certainly have afforded vast amusement to those who had to receive it. Its presentation was about equivalent to a deputation of Bulgarian lawyers presenting a memorial to the British Home Secretary pointing out to him the advantage of abolishing trial by jury and repealing the Judicature acts. There can be no doubt that Mr. MacIver is not incorrect when he says that "in plain truth our British political economists fail to understand that the laws of trade include elements which their theories have not yet grasped. Certain things ought to be, according to theory, which nevertheless are not, so called political economy to the contrary notwithstanding. Our teachers have, I think, still something to learn, but, as seems to me, is at least quite clear that free-trade theories have in practice completely broken down."

As to the prosperity of French commerce there can be no doubt. It is difficult in Paris, in Lyons, in Rouen, or elsewhere to find a commercial man who does not freely acknowledge that business is at the present time more prosperous than at any time since the days of the empire, and such an admission from Frenchmen means a great deal. Mr. MacIver states that his business friends tell him that American commerce is not so depressed as our own, and that even in Russia trade is better with us. Yet Mr. MacIver is not against free trade, although he wants, as many others want, to see reciprocity in trade, but he does not believe that "we shall ever get it by talking political economy to our trading competitors." Foreign nations have less to gain from free trade than we have. It is a matter of business; and if we want real free trade—as assuredly we do—we must go beyond the present teaching of British political economy, and make it the interest of those who now exclude our manufacturers to adopt a different policy. Our foreign friends who decline to understand the advantages that free trade offers would understand at once the disadvantages under which a British retaliatory tariff would place them. Mr. MacIver does not advocate prohibitory tariffs, but merely sufficient to turn the scale in favor of purchasing from such nations as might be willing to accept British manufactures in payment for their productions. We ought, says MacIver in conclusion, to face our national position in a business-like way, as any business man would in his own affairs; to realize that in adopting free trade without reciprocity a mistake has been made, and that our path cannot be too soon retraced. Once admit the principle that retaliatory tariffs may lawfully be used "as a means to an end," and there need be no difficulty in again finding markets for British manufacturers, nor in so working our fiscal system as to strengthen the commercial ties with those magnificent colonies which he trusts may long form with Great Britain one great united empire.

The causes which led to free trade in Great Britain have been concisely and accurately given in a tract recently issued by

the American Iron and Steel Association, wherein, quoting from a paper "On the Patriotism of Tariff Protection," by Mr. Joseph Wharton, it is stated that "a nation's chief duty is to attend scrupulously to its own welfare. It is to pursue its own ends by its own means, strenuously perfecting its organic law and enhancing its internal vigor, while also growing outwardly so far as it may do so with prudence and without trenching on the rights or meddling with the affairs of others. The system of regulating the commerce and influencing the industry of a nation by import duties, while at the same time replenishing its treasury, has grown up by slow degrees to such completeness as we now find covering each nation as the skin covers each animal; it is an integral part of the plan of government in every country that is even slightly raised above barbarism; to abandon it would be not merely to renounce an important part of the public revenue, but would also leave to chance, or rather to the mercy of rivals or enemies, the maintenance of industries necessary to independence. It would, at the same time, be an abandonment by any nation not already at the head of all to attempt to reach equality with other nations in the difficult but lucrative and constantly advancing arts of modern civilization." It is generally felt in America that the revival of business, which has now unquestionably set in there, is due to the extension of the protective policy, and it may fairly be concluded that until in this country liberal free trade is at least replaced by reciprocal free trade, no permanent improvement in trade can reasonably be hoped for.

## The Ownership of the Adams Nickel-Plating Patent.

Those who are watching with interest the progress of suits involving the validity of the Adams patent for nickel-plating, will also be interested in knowing that its ownership is a matter of question. The Boston Traveller of Dec. 6 publishes the following:

The question of the validity of the Adams patent for nickel-plating, which has occupied the attention of the U. S. courts now for eight or nine years, would

**Foot Power Bracket Saws**

Are now so much in demand that some of them are being sold in almost every town in the United States. Many dealers are doing a profitable Christmas trade on such goods at a time of the year when other business is usually dull. The two Saws shown in these cuts are the ones most in demand. We advertise them as for sale at the hardware stores, and they will be called for. We make a fair discount to the trade.

**LESTER SAW.**

The New LESTER SAW is made of Iron with all the working parts of Steel, and contains ALL KNOWN IMPROVEMENTS. It has a polished painted frame, with red stripes, and presents a beautiful appearance. Those parts which are not painted are either Polished or Japanned. We warrant the Saw to be just as herein described, and we know it will give entire satisfaction, being a more expensive machine than those which are now for sale for the same price. It consists of a SCROLL SAW, a TAIL SAW, for inlaid work, arms 18 inches in the clear, claims which will hold saws of any length or width, and place them in four different directions, cutting lumber from 1-16th to 1 inch in thickness; speed, 200 strokes per minute. A CIRCULAR SAW 2 1/2 inches in diameter, which will cut lumber 1/4 inch and less; with an Iron Table, 10 1/2 inches. A DRILLING AND SAWING LATHE, with a variable speed for working metal, wood, and bone. An EASY WHEEL, with wide and narrow rims, 5th. A TURNING LATHE, with Iron Ways and Rest, Steel Centres and three Best Steel Turning Tools; length of Ways, 15 inches; distance between Centres, 9 inches; swing, 3 inches; length of Slide Rest, 4 1/2 inches; number of revolutions per minute, 700. Also, with each Lathe, a Mandrel, 10 inches. Screw Driver, Extra. Belt and tools shown in a nice box for the small tools, and a box for the whole machine. It is taken apart when shipped and packed in a box, but the working parts are all left in place and the frame is put together again by a single bolt.

Price for everything above named, \$88.00  
The same without the Lathe and Circular Saw, \$66.00

When desired, we furnish with the Lathe a very nice Drill Chuck for working metal, and a Tail Stock, with Screw Centre, for \$2.00 extra.

**ROGERS SAW.**

Scroll Sawing and Drilling Attachment. Iron Table, adjustable for inlaying. All the working parts of Iron and steel; weight, with box, 30 pounds; height of table above the floor, 32 inches; 12-inch belt wheel; 1-inch balance wheel; arms 18 inches in the clear; latest improved clamps; round belts; extra drills and wrench. The iron and steel parts are polished or Japanned; the wood is painted dark. It is not as good as our Lester Saw, but is much better than any other cheap machine in the market.

Price, including all the attachments and the box, \$3.00

MILLERS FALLS CO., 74 Chambers St., New York.



Lester Saw.



Rogers Saw.

Established in 1839.

Formerly L. & A. G. COES.

**L. COES & CO.**  
Manufacturers of L. COES  
GENUINE IMPROVED  
AND MECHANICS  
Wide Bar Full Length.  
WIDE BAR FULL LENGTH.  
WIDE BAR FULL LENGTH.

**Patent Screw Wrenches**

UNDER PATENTS DATED

JUNE 26, 1866,  
MARCH 23, 1869,  
REISSUED 1870.

NOVEMBER 10, 1863,  
FEBRUARY 23, 1864,  
REISSUED JUNE 1, 1869,  
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The back thrust when in use borne by the SHANK instead of the Hand'e.

None genuine unless stamped "L. COES & CO."

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HORACE DURRIE & CO., Sole Agents.



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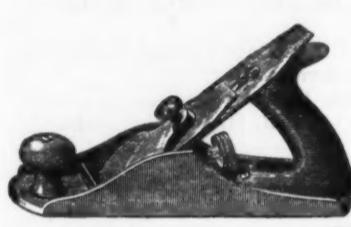
Firth's Best English Cast Steel.

Established in 1854.  
**STEPHENS & CO.**

Manufacturers of U. S. Standard BOXWOOD and IVORY RULES.  
Also Exclusive Manufacturers of L. C. STEPHENS' PATENT COMBINATION RULE.

Rules graduated in foreign measure to order.  
RIVERPORT, CONN.  
H. DURRIE & CO., New York Agents, who will supply the trade at factory prices.

**BAILEY WRINGING MACHINE CO.**  
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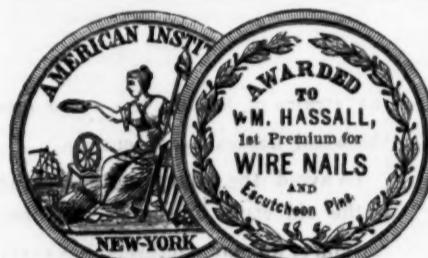
Manufacturers of Novelty and Excelsior Clothes Wringers, Defiance Metallic Planes, Spoke Shaves, Try Squares, etc., Novelty Carpet Sweepers.

Manufacturers' Agents for American Meat and Vegetable Choppers, Silver's Stuffers and Presses, Simpson's Quick-Adjusting Parallel Vises, Novelty and Relief Washing Machines, Domestic Ironing Mangles.



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ESTABLISHED 1850.  
**W.M. HASSALL,**  
Manufacturer of  
American and French  
**Wire Nails**  
With Flat, Round, Oval, Depressed, Screw  
Fancy Heads, etc.

Brass Hooks for Jewelers' Cases, Zinc and Iron Hinges, Turn Buttons, Thumb  
Springs, Book Clasps, and Fancy Metal Work of all kinds.

OFFICE AND WORKS: Nos. 63 & 65 Elizabeth Street, New York.

Patent Improved Cone Pointed, Ratchet Thread,  
**Steel Wire BLIND STAPLES.**



Will hold double the weight of any other Staple in the market, and drive as well either by hand or machine, and not split the wood.

**J. LLOYD HAIGH,**  
Sole Manufacturer  
51 John Street, New York.

**NATIONAL  
Horse Nail Co.**

MANUFACTURERS OF  
**FINISHED**  
(BRIGHT OR BLUED)



These nails are made of the best brands of **WICH WAY IRON**, and are guaranteed to be equal to any in the market.

**NATIONAL HORSE NAIL CO.,**  
VERGennes, Vt.  
HORACE DURRIE & CO., Agents,  
No. 97 Chambers St., New York

**PUTNAM'S  
HOT FORGED & HAMMER POINTED  
Horse Shoe Nails.**



Made from the best of Norway Iron. The only hot forged machine made Horse Shoe Nail in the world that is not sheared or cut at the point. Warranted never to split or silver in the driving, and to hold the shoe longer than any other Nail. For sale by the hardware and iron trade generally.

**PUTNAM NAIL CO.,**  
P. O. Address, Reponset, Mass.  
**BOSTON.**

**ANVIL NAIL CO.**

We desire to call the attention of the trade to our new manufacture of

**Steel Horse Shoe Nails,**

made from metal prepared in the Martin-Siemens Furnace by our PATENT process, which produces a nail having all the requisites for a

**PERFECT HORSE SHOE NAIL.**

The well-known desirable properties of a perfect nail are, that the point should be sharp, the shank stiff, to drive without crippling under the hammer, soft enough to clinch readily, while sufficiently tough to avoid all danger from the "drawing the clinch" or breaking the neck under the head. These properties we claim for the

**"ANVIL HORSE NAILS."**

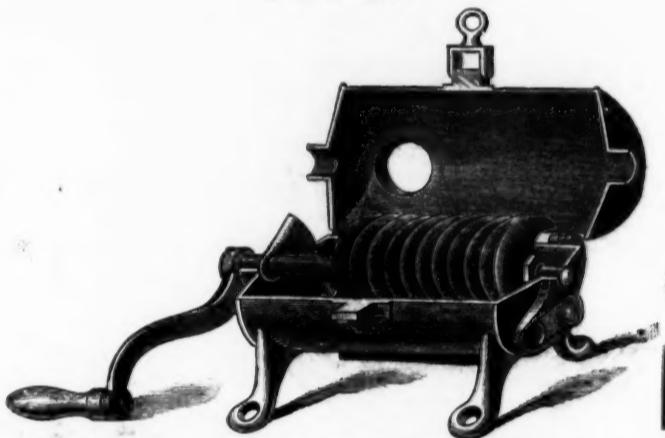
In the process of manufacture the metal is compressed under the head, which gives the nail great strength where it is required (between the shoe and hoof), and the cold rolling gives it a stiffness attained in no other way, while the quality of the metal used insures a clinch and point unsurpassed by any nail ever offered in the market.

Samples and prices sent on application.

**ANVIL NAIL CO.,**  
65, 67 and 69 Washington St., New York.

**PENNSYLVANIA MEAT CUTTER.**

1878.



After many careful tests and experiments, the PENNSYLVANIA MEAT CUTTER is placed upon the market with the fullest confidence of its superiority. It cuts the meat rapidly and is easily adjusted to cut coarse or fine. The meat is of the best quality, cast steel, tempered and hardened, easily removed from the shaft for the purpose of grinding, or can be sharpened if necessary by the use of a flat file, without being taken from the shaft. The comb (below the shaft and cutters) is malleable iron. Through this comb the knives pass and the meat is entirely cut. At the price these are placed upon the market they can reach the consumer at a price that must guarantee popularity.

**PRICE LIST.**

	Per dozen, \$24.00
No. 1, containing 8 Steel Knives.	28.00
No. 2, " " 11 " "	30.00
No. 3, " " 12 " "	36.00

Nos. 1 and 2 are packed 12 to a dozen in a box; No. 3 packed 12 to a dozen in a box.

Discount to the trade, 30 per cent. Orders solicited.

**LLOYD, SUPPLEE & WALTON,**  
No. 625 Market Street, PHILADELPHIA.

**THE "NEW" CROWN  
Christmas Tree Holder**



is offered to the public as a decided improvement upon last year's style, in the hope of meeting with a largely increased demand during the present season.

The usefulness of this article is obvious to anyone who has tried to arrange blocks, boxes or other appliances for holding Christmas Trees.

This Holder is so constructed that it will firmly clamp and hold any size tree under three inches diameter. The legs are placed in the sockets and fastened by the small thumb screws; the ring nut is turned downward, whereby the clamps are thrown outward. The tree is then set in the holder and the ring nut turned upwards until the clamps have a sufficiently tight hold. If desirable, the holder can be fastened to the floor, &c., by means of small tacks and screws. Should the tree shrink and become loose in the holder, a slight turn upwards of the ring nut will tighten it again.

Price, \$9.00 per dozen.

MANUFACTURED ONLY BY  
**THE AMERICAN MACHINE COMPANY,**  
Office and Factory, 1916 to 1924 N. 4th Street, Philadelphia.

# AMERICAN SCREW CO.,

Providence, R. I.,

MANUFACTURERS OF MORE THAN 4000 VARIETIES OF PRODUCT,

AND INCREASING THE ASSORTMENT DAILY.

Machinery employed contains important inventions recently patented, and which are designed to produce Screws at a lower cost to the consumer than has ever been attained.

All goods are distributed through the Hardware trade, to whom a liberal discount will be allowed.

## INTERNATIONAL EXHIBITION.

PHILADELPHIA, 1876.

The United States Centennial Commission has examined the report of the Judges, and accepted the following reasons, and decreed an award in conformity therewith.

### REPORT ON AWARDS.

Product: Iron, Brass and Steel Screws, Tire and Stove Bolts, Rivets.

Name and address of Exhibitor: American Screw Company, Providence, R. I.

The undersigned having examined the product herein described, respectfully recommends the same to the United States Centennial Commission for Award, for the following reasons, viz: Being of a quality nearly approaching perfection, showing the highest attainment in this branch of manufacture.

G. L. REED. Signature of the Judge.

PHILADELPHIA, November 8, 1876.

Approval of Group Judges.

Daniel Steinmetz,  
Jas. Bair,  
Chas. Staples,

G. L. Reed,  
J. D. Imboden,  
Dav. McHardy.

A true copy of the record. FRANCIS A. WALKER, Chief of the Bureau of Awards.  
Given by authority of the United States Centennial Commission.

A. T. GOSHORN, Director-General.

[L.S.] J. L. CAMPBELL, Secretary.

J. R. HAWLEY, President.



After forty years' experience we offer to the trade our Centennial Screws, patented May 30, 1876, as the best we have ever known.

The method of manufacturing is also patented, and we are changing our machinery as fast as possible, to manufacture the improved article only. To introduce them, they will be sold at the same price as the old style screw.

The new screws will be packed in manila colored boxes with the new label covering end of box, and enlarged figures showing plainly contents.

To distinguish this screw we have adopted a trade-mark, which is also secured to us.

The accompanying engravings show the progress of making screw from the old blunt point to style now adopted.

Experience has shown that the weak point of screws, as formerly made, is at the heel of the thread, where all

the strains of forcing the screw into the wood naturally concentrate.

To avoid the sharp angle existing in the old style of screws has been the aim of all manufacturers, but every expedient hitherto adopted has proved as objectionable as the evil complained of.

It will be seen in our new screw that not only is the sharp angle avoided, but the strength very much increased, as illustrated. See sections at lines.

### CLAIM.

"A Pointed Wood Screw having the outer periphery of the thread upon its body cylindrical, while a portion of the body below the thread and near the neck is conical, the remainder of the body to the point being cylindrical, and yet having all the thread brought to an edge of a constant angle, without jogs in the paths between the threads, substantially as described."



1876.

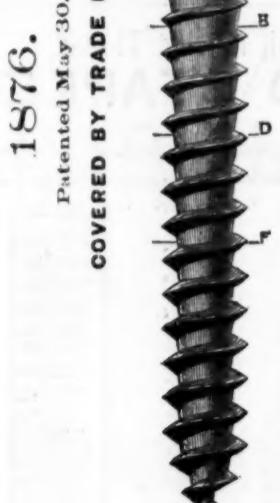
Patented August 10.



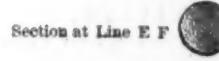
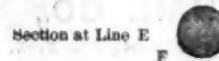
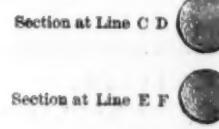
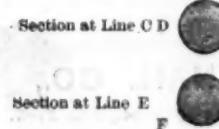
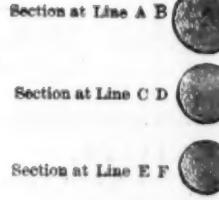
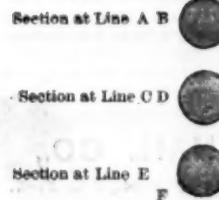
1876.

Patented May 30.

COVERED BY TRADE MARK.



Estimated to be FIFTY PER CENT. stronger than a Screw as commonly made.



## The Iron Age Directory

#### and Index to Advertisements.

Page

# The Stamped Stove Pipe Elbow HOGEN'S PATENT.

*The Stamped Elbow has neither Crimps, Cavities nor Angles which cause accumulations that rust or corrode the iron.*

STAMPED ELBOW CO., formerly HUGEN ELBOW CO.  
**OFFICE AND WORKS, WASON ST. ON LAKE SHORE, CLEVELAND, OHIO.**

**JESSOP'S**  
**Patent Adjustable Pipe Tongs.**



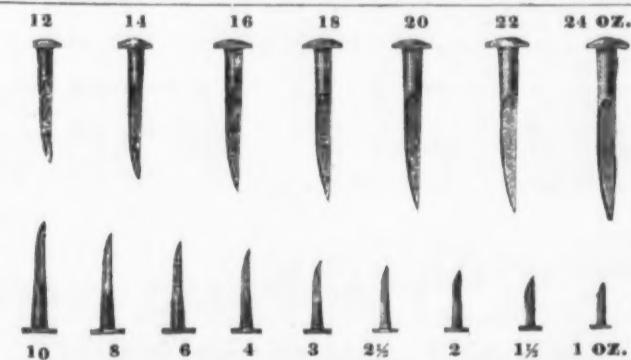
THE BEST IN THE MARKET.

Send for Samples.

**EATON, COLE & BURNHAM COMPANY,**  
Sole Manufacturers,

58 John Street, New York.

**TACKS.**



**NAILS.**

**SWEDES IRON, UPHOLSTERERS', GIMP AND CUT TACKS.**

Tinned, Leathered and Large Head Iron Carpet Tacks.  
TRUNK, CLOUT AND FINISHING NAILS, BRADS, PATENT BRADS, &c.  
Lining, Saddle and Tufting Nails, Coffin Tacks and Tufting Buttons.

**COPPER, ZINC, STEEL & SWEDES & COMMON IRON SHOE NAILS, &c.**

Copper, Iron and Galvanized Boat Nails,

Regular or Chisel Pointed.  
Cass & Iron Wire Nails, Moulding Nails & Escutcheon Pins, Chair & Cigar Box Nails, 2d & 3d Fine Nails, Roofing Tacks and Nails, &c., &c.

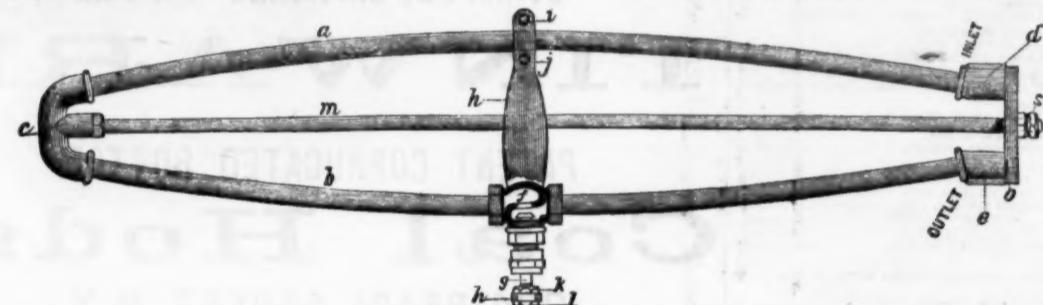
MADE BY THE

**AMERICAN TACK CO.,** Fairhaven, Mass.

A full line of goods may be found at our

NEW YORK SALESROOM, No. 117 Chambers Street.

**BARR'S ELLIPTIC STEAM TRAP.**



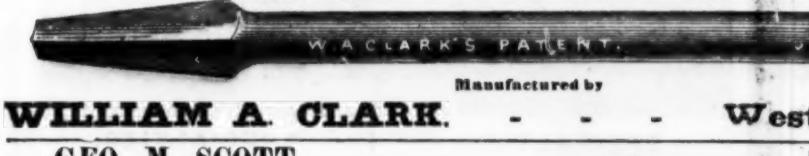
Has no floats or concealed parts to get out of order. Can be set to discharge water at any desired temperature. Once adjusted, never needs the slightest attention, being ABSOLUTELY AUTOMATIC in action. Never FREEZES in exposed situations, such as Rolling Mills, Hammer Shops, &c. Simplest in construction of any trap made. Has no reservoir in which to accumulate condensation, but discharges incessantly. Can be set in any position, either side or end up, without altering its working. Occupies less space, and being so light, can be used in situations where no other can. Send for Circular to manufacturers.

**PANCOAST & MAULE,** 243 and 245 South Third St., Philadelphia.



**CLARK'S PATENT EXPANSIVE BITS**

Made of JESSOP'S BEST CAST STEEL, and warranted superior to any other  
Two sizes: Large Size Boring,  $\frac{3}{4}$  to 3 inches; Small Size Boring,  $\frac{3}{8}$  to  $\frac{1}{2}$  inches.



**WILLIAM A. CLARK.**

GEO. M. SCOTT,  
Bellows Manufacturer,  
Johnson Street,  
Cor. 22d St.,  
CHICAGO, ILL.

**H. PRENTISS & COMPANY.**

Sole Manufacturers of  
Goddard's Patent-Relieved Machinists', Blacksmiths' and Gasfitters' Taps. Solid Reamers,  
Screw Plates and Dies.

Headquarters for B.  
lings & Spencer Co.'s  
manufactures, Twist  
Drills, Chucks, Machine  
Set and Cap Screws, &c.

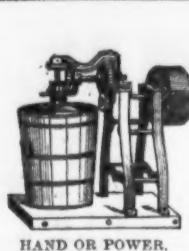
Dealers in Machinists' Supplies. — 14 DEY STREET, NEW YORK.



HAND FREEZER.

2 to 25 qts.

\$3.50 to \$35.00



HAND OR POWER.

25 and 50 qts.

\$75.00 and \$175.00



HAND OR POWER ICE CRUSHER.

\$75.00

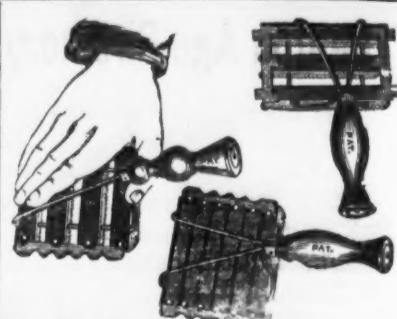
SANDS' TRIPLE MOTION WHITE MOUNTAIN ICE CREAM FREEZER.

Galvanized iron outside, tin inside. No excrescences of oxide of zinc need be feared in the use of this Freezer.

Simple in construction, perfect in results. Send for descriptive circular and discounts of this celebrated

FREEZER. Address

WHITE MOUNTAIN FREEZER CO., Laconia, N. H.

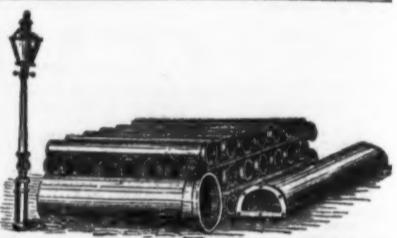


**The Perfect Comb.**

We call your attention specially to our new patent end-peppered comb. The result of a long series of experiments, making a few minor changes in all the requirements of a "Perfect Comb," it is better, stronger and more durable than any ever before invented. The raised wire shank gives what has never before been attained, viz., a hand holding the comb, in such a position that the hand cannot come in contact with the wire, while using the comb. The wire braces which run from the shank over the back to the front teeth give strength and durability in a direction never heretofore attained, and at the same time make the comb very light, and when lashed by the fingers in connection with the raised wire shank the comb is more firmly, easily, and completely held, and with much less fatigue to the hand than is possible in any other formation—in short, it needs but a trial to vindicate its name: "The Perfect Comb."

**THE LAWRENCE COMB CO.**  
Factory and Office,  
382 2d Ave., cor. 2d St., N. Y.

**W. S. CARR & CO.**  
Manufacturers of  
**CARR'S**  
PATENT  
Water  
Closets,  
PUMPS, CABINET WOOD WORK, &c.  
106, 108 & 110 Centre Street,  
Factory, Mott Haven, NEW YORK.



"REMINGTON'S"  
NEW LINE  
REVOLVERS.

Full Nickel Plated.

Checked Rubber Stocks.

\$2.50, \$8.00, \$9.00.

22 Cal. 38 Cal. 41 Cal.

\$5.00, \$8.50, \$9.00.

30 Cal. 32 Cal. 38 Cal. With ejectors.

Best in Market. Discount to dealers only. Cut this out and send for illustrated wholesale catalogue and price lists of GUNS, RIFLES, PISTOLS, AMMUNITION, &c., &c. Address

E. REMINGTON & SONS,

283 Broadway, NEW YORK.

Self-Measuring Oil Tank!

Patented Oct. 23d, 1878.



Economy, Convenience and Cleanliness Combined.

Send for circular.

**Kellogg & Johnson,**  
Sole Manufacturers,

ELMIRA, N. Y.

AGENTS.

JENNINGS & BENTLEY, 59 Jefferson Avenue, Detroit.

A. M. GILBERT & CO., 95 Lake Street, Chicago.

" " 157 Water Street, Cleveland.

" " 116 Main Street, Cincinnati.

STAR OIL COMPANY, 215 Michigan Street, Buffalo.

J. KENDALL, SON & CO., Winona, Minn.

MCKIGAN & CO., Newark, N. J.

McKIGAN & CO., Newark, N. J.

ANVIL & VISE COMBINED.



No. 1, 10x3x4 in. face, 4 in. jaw Vise, weight 40 lbs., \$4.00.

No. 2, 8x3x3 in. face, 3 1/2 in. " 2 1/2 lbs., \$3.75.

No. 3, 6x3x3 in. " 2 1/2 in. " 2 1/2 lbs., \$3.00.

The face of the Anvil is chill hardened. Terms cash.

Delivered on cars at Worcester.

RICHARDSON MFG. CO., Worcester, Mass.

Liberal discount to the trade.

COBB & DREW,

Plymouth, Mass.

Manufacturers of Copper, Brass, and Iron Rivets. Common and Swedes Iron, Leathered, Carpet, Lace and Gun Tacks. Finishing, Hungarian, Trunk, Chest and Case Box Nails, &c. Rivets made to Order.

NEW YORK AGENCY

George C. Grundy,

HARDWARE,

165 Greenwich Street.

Agents for the Philadelphia Star Carriage and Tire Bolts.

70 CHARCOAL.

BUSHELS OF CHARCOAL together with a net profit of

per cord of wood, can be made by using

Jean A. Mathieu's Patent Furnace.

Address JEAN A. MATHIEU,

care Vaillant, 15 S. Seventh Street,

Room 2, PHILADELPHIA, Pa.

\$7

BOILERS, ENGINES AND TANKS FOR SALE

At LESLIE BOILER WORKS Pearl, near Greene

St., Jersey City. Repairs promptly attended.

FRANCIS MANY,

143 Chambers St., New York.

BOILERS, ENGINES AND TANKS FOR SALE

At LESLIE BOILER WORKS Pearl, near Greene

St., Jersey City. Repairs promptly attended.

# Henry Disston & Sons,



## KEYSTONE SAW, TOOL, STEEL AND FILE WORKS,

Front and Laurel Streets, Philadelphia.

Branch Works, Tacony, Philadelphia.

Branch House, Randolph & Market Streets, Chicago, Ill.

## GOLD MEDAL.

AT THE EXPOSITION UNIVERSELLE,  
Paris, 1878,

In competition with the world, the highest prize and only GOLD MEDAL given for

**SAWS.**

was awarded to

**HENRY DISSTON & SONS, Philadelphia.**



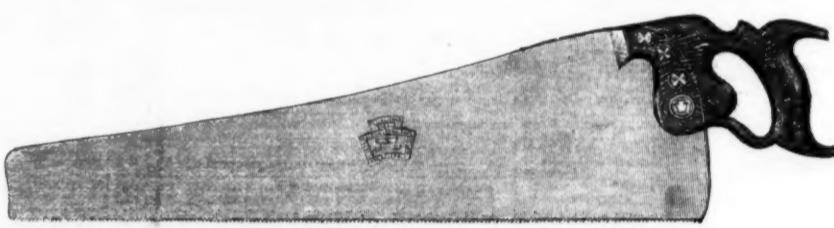
This cut represents the justly celebrated No. 7 Hand Saw, which was mainly instrumental in securing the wide reputation for Disston's Saws. It is the cheapest Saw upon which we put our own name, and none but the most skilled workmen take part in its



manufacture. Our hold upon the trade depends chiefly upon maintaining the high standard of this Saw, which we are determined to do. Every Saw of this brand is fully warranted.

**NO. 7 DISSTON & SONS' CAST-STEEL WARRANTED, BEECH HANDLE.**

**D 8** HAND SAW.



**CENTENNIAL, No. 76.**

## GREAT AMERICAN CROSS-CUT SAW.

Patented October 4th, 1870.

Particular care is taken in the manufacture of these Saws. They are made of the finest quality of steel, of uniform and high temper, ground gradually tapering from the teeth to the back, and are set and sharpened in the most perfect manner. Each Saw is highly finished and

nicely etched, and guaranteed in every respect. The demand for this Saw has been and is constantly increasing, the number sold in the last year reaching over fourteen thousand.

This cut also represents our Improved Patented Cross-Cut Handles attached to the Saw.

## GREAT AMERICAN ONE-MAN CROSS-CUT SAW.



This Saw is manufactured under the same patent, and is as highly finished and fully warranted as the regular Great American Cross-Cut Saw, but is ground on the same principle as our extra quality hand Saws.

We have lately improved the Files for keeping the teeth of the Great American Saws in order. Parties ordering Saws would find it to their benefit to order a few of these files, for it is almost impossible to get the teeth out of order if the Great American File is used.

# New York Wholesale Prices, December 11, 1878.

## HARDWARE.

ANVILS	AMERICAN	20¢ to 25¢
"	Wright's.	20¢ gold 10¢ over 250 lbs 10¢ gold
"	Wright's Mouse Hole.	10¢ currency
"	Trenton.	10¢ to 12¢
"	Zagie Anvils (American).	20¢ to 25¢
APPLE PARERS, &c.		
Turn Table.	20¢ to \$6.75.	dis 10¢ to 15¢
"	20¢ to \$6.75.	dis 10¢ to 15¢
May State.	20¢ to \$6.00.	dis 10¢ to 15¢
Reading.	72.	20¢ to \$6.00.
"	74.	20¢ to \$6.00.
"	75.	20¢ to \$6.00.
MAXIM CORER AND SLICER.		
Augers and Bits.		
COLL. Valley Mfg. Co.		
Longmire Co. Co.		
Beecher (French, Swift & Co.).		
Griswold.		
Kasson's Patent.		
Cook's, Douglass Mfg. Co.		
Cook's, Ives.		
Smith Mfg. Co.'s S. Augers.		
"	B. S. Augers.	
"	C. S. Bits.	
"	Jennings' Bits.	
Jennings' Bits.		
Wright's "Jewel" Bits.		
Lewis' Single Twist Bits.		
Andrews Bits.		
Crisowald's Patent Bits.		
Expansive Bits, C. H. & Co.		
Ives.	\$20 to \$100.	dis 10¢ to 15¢
"	Blake's.	20¢ to \$10.
"	Parmelee's.	20¢ to \$10.
Hart Mfg. Co.		
Follow Augers		
French, Swift & Co.		
"	Bonney's Adjust.	20¢ to \$10.
"	Stearns' Adjust.	20¢ to \$10.
Ives' Expansive.	20¢ to \$10.	dis 10¢ to 15¢
Univer. Adjustable.	20¢ to \$10.	dis 10¢ to 15¢
Gimlet Bits.		
Diamond.	20¢ to \$10.	dis 10¢ to 15¢
"	Bee's.	20¢ to \$10.
Double Cut Gimlet Bits.		
Hartwell's.	20¢ to \$10.	dis 10¢ to 15¢
Douglas'.	20¢ to \$10.	dis 10¢ to 15¢
"	Ives'.	20¢ to \$10.
Horse's Bit Stock Drill.	20¢ to \$10.	dis 10¢ to 15¢
Hommiedieu's Ship Augers.		
Vatrous Ship Augers.		
AWL HINTS.		
Swing, Brass, Ferrule.	\$1.00 per gross.	dis 10¢ to 15¢
Pent Sewing, Short.	\$1.00 per gross.	dis 10¢ to 15¢
"	Long.	\$1.00 per gross.
Peg, Plain Top.	\$1.00 per gross.	dis 10¢ to 15¢
"	Wood.	12¢ to 15¢
AWLS, Brad Sets, &c.		
Avis Sewing, Common.	\$ gross 1.35.	dis 10¢ to 15¢
Sewing, Best.	\$ gross 1.40.	dis 10¢ to 15¢
Shoulder Peg.	\$ gross 1.40.	dis 10¢ to 15¢
Centent Peg.	\$ gross 1.40.	dis 10¢ to 15¢
Shouldered Brad.	\$ gross 1.40.	dis 10¢ to 15¢
Handled Brad.	\$ gross 1.40.	dis 10¢ to 15¢
Handled Scratch.	\$ gross 1.40.	dis 10¢ to 15¢
Social.	\$ gross 1.40.	dis 10¢ to 15¢
Brad Sets, Aiken's.	\$ gross 1.20.	dis 10¢ to 15¢
No. 42, \$10.50.	dis 10¢ to 15¢	
"	Stanley's Excelsior.	No. 1, \$10.00.
Axes.		
John Jones & Co.	\$0.50.	dis 10¢ to 15¢
Axes.		
Common (Guy C. Hotchkiss, Field & Co.).	\$0.50.	dis 10¢ to 15¢
Solid Collar, Case Hardened, Chilled Box.	\$0.50.	dis 10¢ to 15¢
Axle Gears.	Fraser's.	
AXLE SPRINGS.		
1/4 in. Spring Balances, List July 25.		
Bells.		
Hand Light Brass.		
Extra Heavy.		
White Metal.		
Silver Chime.		
Swiss.		
Glasse (Cone's Patent).		
Gong, Chinese.		
Yankee.		
Sarton's.		
Crank, Taylors.		
White.		
Blue.		
White Crayons.		
Chisels.		
Hartwell Tool Co. (all kinds).		
Socket Framing, Crossman.		
"	Bart.	
"	Hart Mfg. Co.	
"	Withey Tool Co.	
Chubbs.		
White.		
Red.		
Blue.		
Clips, AXLE.		
Norway or Best.		
Stainless.		
Extention Barbs.		
"	Ives'.	
Diagonal.		
Angular.		
Blind Adhesive.		
Blind Fasteners.		
Mackrell's.		
Van Sand's.	No. 2000, \$14.00.	dis 10¢ to 15¢
"	old pattern.	20¢ to 30¢
Washburn's Patent.	20¢ to 30¢	dis 10¢ to 15¢
Blind Staples.	20¢ to 30¢	dis 10¢ to 15¢
Boardman's Patent, 1/2 in. and larger.	20¢ to 30¢	dis 10¢ to 15¢
Blocks, BURR & CO.		
Extention Barbs.	20¢ to \$1.00.	dis 10¢ to 15¢
"	20¢ to \$1.00.	dis 10¢ to 15¢
Diagonal.	20¢ to \$1.00.	dis 10¢ to 15¢
Angular.	20¢ to \$1.00.	dis 10¢ to 15¢
Blind Adhesive.	20¢ to \$1.00.	dis 10¢ to 15¢
Blind Fasteners.	20¢ to \$1.00.	dis 10¢ to 15¢
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"	20¢ to \$1.00.	dis 10¢ to 15¢
Diagonal.	20¢ to \$1.00.	dis 10¢ to 15¢
Angular.	20¢ to \$1.00.	dis 10¢ to 15¢
Blind Adhesive.	20¢ to \$1.00.	dis 10¢ to 15¢
Blind Fasteners.	20¢ to \$1.00.	dis 10¢ to 15¢
Mackrell's.		
Van Sand's.		
"	old pattern.	20¢ to 30¢
Washburn's Patent.	20¢ to 30¢	dis 10¢ to 15¢
Blind Staples.	20¢ to 30¢	dis 10¢ to 15¢
Boardman's Patent.	1/2 in. and larger.	20¢ to 30¢
Blocks, BURR & CO.		
Extention Barbs.	20¢ to \$1.00.	dis 10¢ to 15¢
"	20¢ to \$1.00.	dis 10¢ to 15¢
Diagonal.	20¢ to \$1.00.	dis 10¢ to 15¢
Angular.	20¢ to \$1.00.	dis 10¢ to 15¢
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Washburn's Patent.	20¢ to 30¢	dis 10¢ to 15¢
Blind Staples.	20¢ to 30¢	dis 10¢ to 15¢
Boardman's Patent.	1/2 in. and larger.	20¢ to 3

SAFETY NUTS.				
Boynton's Patent.	... per doz \$1.25 net			
Stilman's Genuine	... per doz \$1.25 net			
" Imitation.	... per doz \$1.25 net			
Common Lever.	... per doz \$2.00, dis 25% " No. 2, \$2.50, No. 3, \$3.00, No. 4, \$4.00			
Leach's.	... per doz \$2.00, dis 25% " No. 2, \$2.50, No. 3, \$3.00, No. 4, \$4.00			
Nash's.	... per doz \$2.00, dis 25% " No. 2, \$2.50, No. 3, \$3.00, No. 4, \$4.00			
Hammer, Hotchkins	... per doz \$1.25 net			
Bemis & Call Co.'s New Pat.	... per doz \$1.25 net			
Aiken's Patent Lever.	... per doz \$1.25 net			
" Imitation.	... per doz \$1.25 net			
Hart's Patent Lever.	... per doz \$1.25 net			
Distinct's.				
Scalers.				
Hatch, Counter.	... per doz \$1.00, dis 25% " Tea.			
Union Platform.	... per doz \$1.00, dis 25% Turnbull's Market			
Turnbuckles.	... per doz \$1.00, dis 25% Howe's.			
Chatillon's Grocers'.	... per doz \$1.00, dis 25% " Eureka.			
Family Universal.	... per doz \$1.00, dis 25% Favard's.			
" Turnbull's.	... per doz \$1.00, dis 25% " Eureka.			
Scale Beams, Chatillon's list.	... per doz \$1.00, dis 25% " Sargent's list.			
SCRAPERS.				
Box, Double.	... per doz \$1.00, dis 10% " 2" ... per doz \$1.00, dis 10% Defense Box and Ship.			
Foot.	... per doz \$1.00, dis 10% " Ship.			
" (Provident Tool Co.	... per doz \$1.00, dis 10% Screws.			
Screw Drivers.				
Hart, Biven & Mead, new list.	... per doz \$1.00, dis 10% Dougherty, Mig. Co.			
John's.	... per doz \$1.00, dis 10% Diston's Patent Excisor.			
Buck Bros.	... per doz \$1.00, dis 10% Stanley Rule & Level Co., Black Hand.			
Sargent & Co.'s.	... per doz \$1.00, dis 10% Screws.			
Flat HV Iron.	... per doz \$1.00, dis 10% Flat Head Iron.			
Flat Head Brass.	... per doz \$1.00, dis 10% Round Head Brass.			
Brass and Silver Capped.	... per doz \$1.00, dis 10% Japanese, 1st or 2d Screws.			
Coach Pattern Gimpel Point.	... per doz \$1.00, dis 10% Coach Pattern Gimpel Point.			
Bed.	... per doz \$1.00, dis 10% Machine, Flat Head, Iron, Am. Screw Co.			
Bench, Iron.	... per doz \$1.00, dis 10% " Round Head, Iron.			
Hand Bell, Sargent's.	... per doz \$1.00, dis 10% " Hickory.			
Hand Bell, Sargent's.	... per doz \$1.00, dis 10% " Humason, Beckley & Co.'s.			
Jack Bell Bottom.	... per doz \$1.00, dis 10% Jack (Wilson's).			
Sargent & Co.'s.	... per doz \$1.00, dis 10% Sheets and Screws.			
Cast Steel.	... per doz \$1.00, dis 10% " Iron, " American.			
Wing-nut.	... per doz \$1.00, dis 10% Seymour's Straight Trimmers.			
Pruning.	... per doz \$1.00, dis 10% Garnard's Lam Trimmers.			
Tinners.	... per doz \$1.00, dis 10% Hemisch Trimmers and Scissors.			
Stamping Tinware.	... per doz \$1.00, dis 10% Stamping Tinware.			
IRON.				
IRON.—DUTY: Bars, 1 to 1 1/4, F. B.; Sheet, Band Hoop and Scroll, 1 1/2 to 14, F. B.; provided, that none of the above iron shall pay a less rate of duty than 35 per cent. Pig, 25 to 100 lbs; Polished Sheet, 50, F. B.; Wrought Iron, 25 to 100 lbs; Cast Scrap, 50, F. B.; Railroad rod, 25 to 100 lbs; Boiler and Plate, 14, F. B.				
Pig Iron—AMERICAN.				
Russell's Anti-Friction.	... per doz \$1.00, dis 10% Moore's Anti-Friction.			
Bilding Shutter.	... per doz \$1.00, dis 10% " Sargent's list.			
Sheaves and Spades.	... per doz \$1.00, dis 10% " Kimball's stamped "Aimes".			
Sheaves and Spades.	... per doz \$1.00, dis 10% Old Colony.			
Remington's (Lever) Patent.	... per doz \$1.00, dis 10% Dunning's Spades and Scoops.			
Rowland's "Regular," new list.	... per doz \$1.00, dis 10% " Patent, new list.			
Oxford Patent, new list.	... per doz \$1.00, dis 10% Sheaves and Spades.			
Iron and Brass Head, E. list.	... per doz \$1.00, dis 10% Tinned Iron.			
Polished Steel.	... per doz \$1.00, dis 10% Screws.			
Slates.				
Equipped Slates, Round Cornered, by case.	... per doz \$1.00, dis 10% Less than a case.			
Spoke Shaves.	... per doz \$1.00, dis 10% Defense Metallic.			
Iron.	... per doz \$1.00, dis 10% Wood.			
Bailey's.	... per doz \$1.00, dis 10% Spoke Trimmers.			
Bonney's.	... per doz \$1.00, dis 10% Stearns'.			
Bonney's.	... per doz \$1.00, dis 10% Ives'.			
Arkansas.	... per doz \$1.00, dis 10% Douglas.			
Spoons.	... per doz \$1.00, dis 10% Tinned Iron.			
British.	... per doz \$1.00, dis 10% Derby Silver Co.			
L. Boardman's Sons, A1.	... per doz \$1.00, dis 10% Rogers & Bro., A.1.			
Rock & Co.	... per doz \$1.00, dis 10% Hall & Elton.			
Holmes, Booth & Haydens.	... per doz \$1.00, dis 10% German Silver.			
Diamond & L. Boardman's Sons.	... per doz \$1.00, dis 10% The (P. S. & W.) Tins.			
Tables.	... per doz \$1.00, dis 10% The Cowles Hdw. Co.			
case lots.	... per doz \$1.00, dis 10% Sheets and Dies.			
Sheets and Dies.	... per doz \$1.00, dis 10% " Lighting" Screw Plate.			
Stone.				
Hindostan Stone.	... per doz \$1.00, dis 10% Ax Stone.			
" Slips.	... per doz \$1.00, dis 10% Sand Stone.			
Washita Stone.	... per doz \$1.00, dis 10% " Slips.			
Arkansas Stone.	... per doz \$1.00, dis 10% " Slips.			
Turkey Oil Stone (Boyd & Chase).	... per doz \$1.00, dis 10% Slips.			
Lake Superior (Boyd & Chase).	... per doz \$1.00, dis 10% Slips.			
Grindstone, Fully, Loring's.	... per doz \$1.00, dis 10% Steel.			
Steel.	... per doz \$1.00, dis 10% Iron.			
Nickel.	... per doz \$1.00, dis 10% Tin Squares and T Bevels.			
Star Tin Squares and Bevels.	... per doz \$1.00, dis 10% Dissot's Tin Squares and T Bevels.			
Winterbottom's Tin and Mfr.	... per doz \$1.00, dis 10% Balley's Tin Squares and T Bevels.			
Patent Planchised.	... per doz \$1.00, dis 10% Russian.			
American Coil.	... per doz \$1.00, dis 10% American.			
BRASS.				
Tin Case.	... per doz \$1.00, dis 10% Enterprise Mfg. Co. (Champion).			
Wood Bottom.	... per doz \$1.00, dis 10% All Iron.			
Nicholson's Co.	... per doz \$1.00, dis 10% The Case.			
Common and Ring.	... per doz \$1.00, dis 10% Tin Tap Borens.			
Enterprise Mfg. Co.	... per doz \$1.00, dis 10% Tapes, Measuring.			
Ammon.	... per doz \$1.00, dis 10% Spring Tapes.			
Thermometers.	... per doz \$1.00, dis 10% Tin Case.			
Enterprise Mfg. Co. (Champion).	... per doz \$1.00, dis 10% Wood Bottom.			
Double-Pointed Tacks.	... per doz \$1.00, dis 10% All Iron.			
T.	... per doz \$1.00, dis 10% Nicholson's Co.			
Common and Ring.	... per doz \$1.00, dis 10% Tin Tap Borens.			
Ives' Tap Borens.	... per doz \$1.00, dis 10% Enterprise Mfg. Co.			
Tapes, Measuring.	... per doz \$1.00, dis 10% Ammon.			
Ammon.	... per doz \$1.00, dis 10% Spring Tapes.			
Thermometers.	... per doz \$1.00, dis 10% Tin Case.			
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Enterprise Mfg				

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We warrant these Faucets to be as represented, measuring correctly and working more easily in heavy molasses than any Measuring Faucet in the market. No grocer can afford to be without them for the saving time, and time is money. They insure perfect cleanliness, requiring no tin measures or funnel to collect dust and draw flies. They do not drip. They prevent all waste, as no molasses is wasted. They are the embodiment of simplicity, and consequently they are always in order. They work easily in the heaviest moasses. They are warranted to measure correctly, according to U. S. Standard. MANUFACTURED EXCLUSIVELY BY

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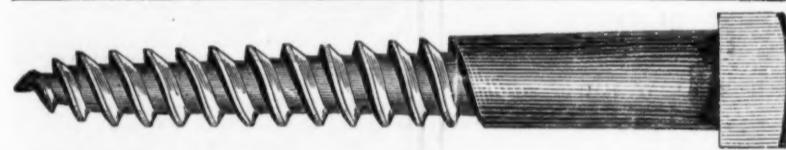
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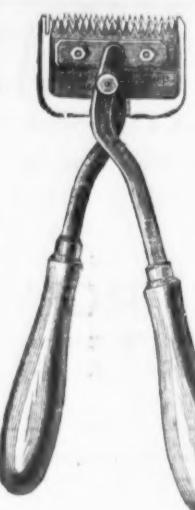
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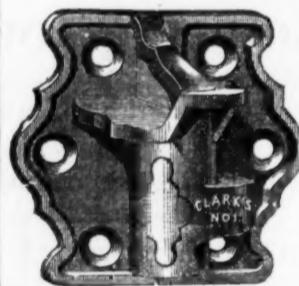
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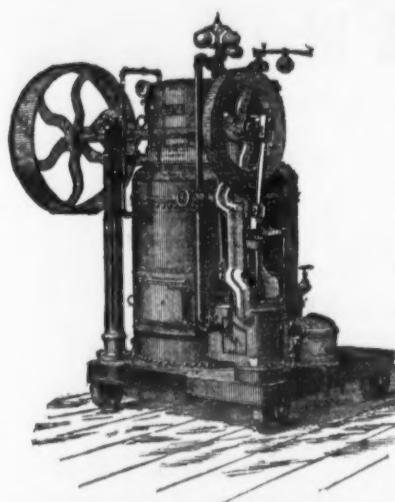
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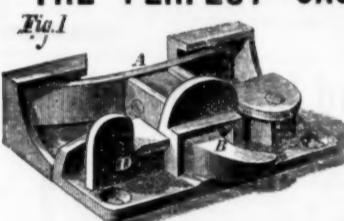


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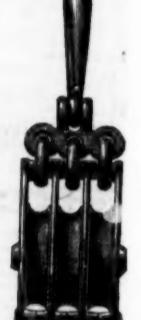
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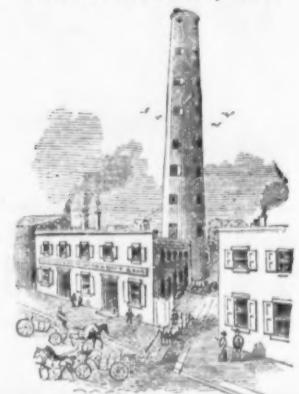
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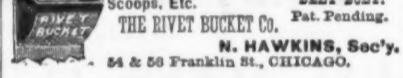
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We beg to refer to the following Stove Manufacturers among so other houses using the Weston Machine:—Richardson & Boynton, S. S. Jewett & Co., Fuller, Green & Co., Peavy & Co., Detroit Stove Works, Michigan Stove Co., Co-operative Stove Co., E. & C. Gurney, Hamilton & Toronto, and many others.

INFRINGEMENTS.

We call attention to infringements of the Weston Machine by other manufacturers who claim to be entitled to the use of the Weston Machine.

The Weston Co. are owners by grant or purchase of all forms of Automatic Switches for Plating Machines. The adoption of these machines will certainly lead to great loss to parties purchasing or using them.

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It is a common method to advertise Governors *without cost*, unless less satisfactory to the customer, and then charge *High Prices* for what may good Governors will do. Various Governors inferior to the "Judson" are sold in this way, operating well enough for three months, to insure collection of the pay, but becoming useless after a year's wear—their construction lacking durability. The Judson Governor is guaranteed to be not only the best Regulator of Engines, but also the most durable Governor made. Parties in buying other Governors should stipulate that their durability be guaranteed, and should also take care that they do not, for much inferior Governors, pay higher prices than those shown in the accompanying list. We guarantee the Judson Governor to do all any other Governor can do in accuracy and durability—the man who sells it—*we guarantee it shall do more.*



Improved Steam Governor.  
No Charge for Boxing or Cartage.  
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Reduced Price List,  
OCTOBER 15, 1878.

For dimensions of Governor, see Illustrated Price List.

Size, Inch.	Plain.	Bright finished.	Extra for Screw'd Valve.	Stop Valve.
1	\$1.00	\$17.00	\$1.00	....
1 1/2	16.00	18.00	1.00	....
2	20.00	20.00	2.00	....
2 1/2	23.00	23.00	2.25	....
3	27.00	27.00	2.50	\$6.00
3 1/2	31.00	2.75	7.50	....
4	32.00	37.00	3.25	9.00
4 1/2	36.00	41.00	3.50	11.00
5	40.00	46.00	3.75	12.00
5 1/2	45.00	52.00	4.25	14.00
6	54.00	59.00	4.50	17.00
6 1/2	64.00	71.00	5.00	20.00
7	74.00	84.00	5.50	25.00
8	84.00	95.00	6.00	31.00
9	97.00	109.00	6.50	37.00
10	112.00	125.00	7.00	42.00
11	132.00	146.00	8.00	50.00
12	160.00	176.00	9.00	60.00
13	180.00	198.00	10.00	75.00
14	200.00	220.00	12.00	....

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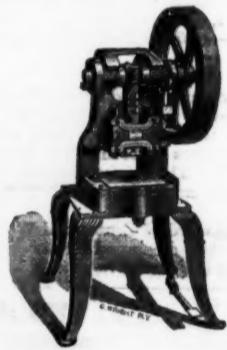
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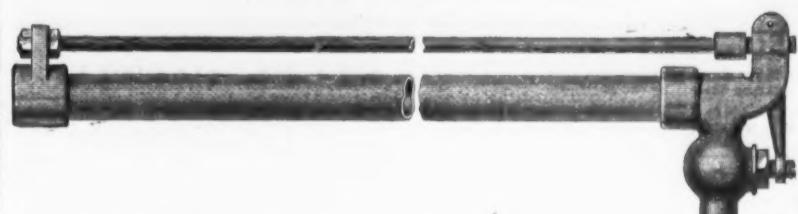
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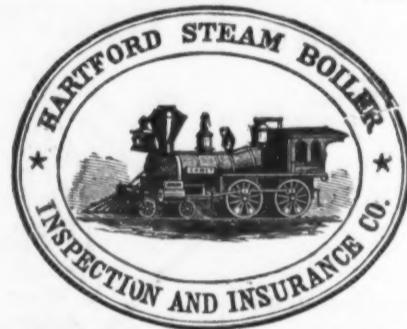


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BOYNTON'S SAWS were effectively tested before the judges at the Philadelphia Fair, July 6th and 7th. An ash log, eleven inches in diameter, was sawed off, with a four-and-a-half-foot lightning cross-cut, by two men, in precisely six seconds as timed by the chairman of the Centennial Judges of Class Fifteen. The speed is unprecedented, and would cut a cord of wood in four minutes. The representatives of Russia, Austria, France, Italy, Spain, Belgium, Sweden, England, and several other countries, were present, and expressed their high appreciation.

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